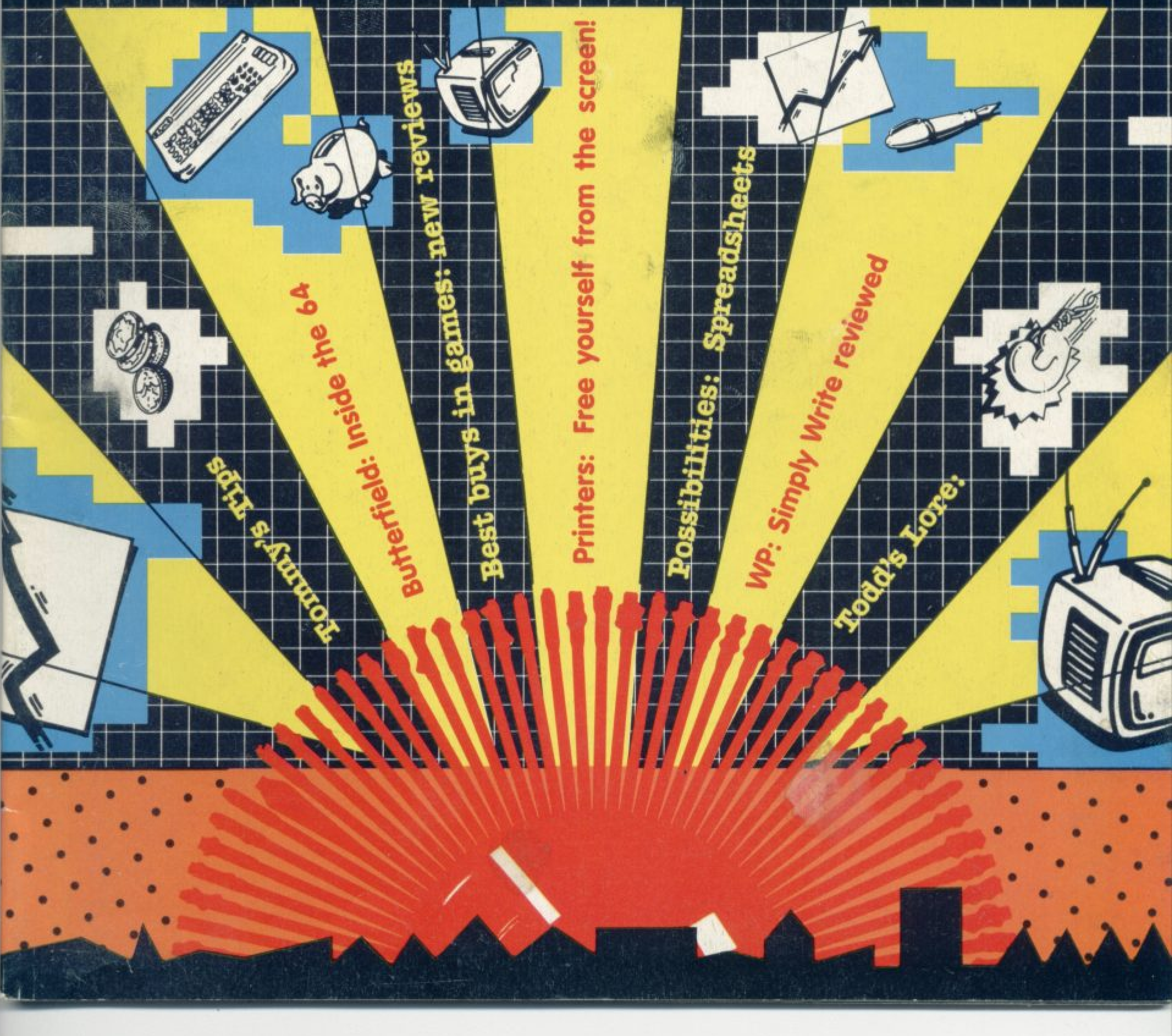
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Volume 1 Issue 2 November 1983 Price 85p

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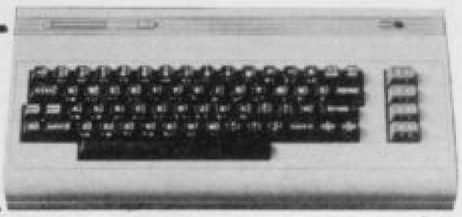
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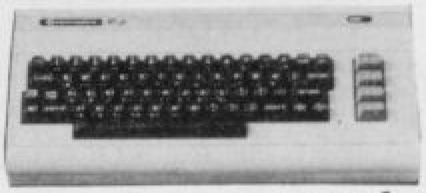
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Another Calc?

"For the first time, spreadsheet software has caught up with recent developments in hardware." So says Richard Sumner, Sales Director of Marketing Micro Software; his company is the sole UK distributor for PractiCalc, a most impressive professional spreadsheet calculator program for the Commodore 64 and Vic-20. We have PractiCalc under review right now, and so far it's looking good against our previous favourite – the Handic CalcResult package marketed in the UK by Kobra.

PractiCalc recently topped the Management category of the Software Showcase at the Summer Consumer Electronics Show '83 in Chicago, where a panel of six editors from trade and consumer computer publications presented awards to 62 winners in nine categories. Mind you, since over 180 programs were submitted for competition it looks like there weren't *too* many losers ...

PractiCalc looks very good. As well as standard spreadsheet functions it offers high- and low-resolution graphics, alphanumeric sort and search, and a whole bunch of mathematical and trigonometric functions.

Computer Software Associates, the US company that wrote PractiCalc, has commented "As the demand for serious applications software becomes greater, we envisage that PractiCalc will become one of the 'classics' for the Commodore 64 and Vic ... We were extremely gratified to be selected the only winner in the home management category."

Suggested retail prices are PractiCalc Plus (the Vic one) £29.95 for cassette, £34.50 for disk; Practicalc 64, £39.95 for cassette and £44.50 for disk. More information from Marketing Micro Software on 0473 462721.

Ready reference

We've always liked the idea of ready-reference cards, not least because our *Programmer's Reference Guides* are both starting to fall apart under incessant thumbing through the summary appendices to check CHR$ codes and colour combinations. So we perked up when Elkan Electronics sent us samples of the three quick-reference cards it's selling – one for the Vic, one for the 64, one for 6502 assembler.

The cards are American, from something called Nanos Systems Corp, and they come as a single sheet folded (eight times in the case of the Vic card) to end up with a long thin inside-pocket-size package. They are heat-sealed inside a cellophane wrapper, which keeps them farm-fresh until you buy one.

On the Vic one you get a full set of characters and graphics symbols (very clear reproduction) with the relevant POKE and CHR$ values (including the 'alternative' CHR$ codes) as well as a quite neat guide to getting them from the keyboard – which keys you've got to press, in other words – and the upper- or lower-case equivalent for each.

In addition there's a separate and complete list of PRINT CHR$ codes and effects for both character sets. Also packed on to the card are some of the standard tables and charts – like musical note values (the 'official' Commodore version, not the more accurate one from the *Programmer's Reference Guide* which recommends different POKEs and modulation for some notes).

There is a list of error messages which doesn't add much, like BAD SUBSCRIPT is defined as "Addressed array with invalid subscript". More useful is a quick summary of printer control codes, a note on DIY graphics assembly, a hex/dec converter (but not hex/dec/bin), the border/screen colour combinations, device and STatus codes, and summaries of Basic – no handy list of abbreviations, though. A couple of sides of the card provide a condensed memory map which isn't too useful and a list of selected locations to POKE which is much better.

That's it for the Vic. The 64 card is basically similar, with a couple of extra folds giving four more sides to cover sprites (very well) and sound (less good but ok).

The 6502 card unfolds to reveal 16 columns of information. What do you get in it? Well, there's a short explanation of the varying lengths of machine-code instructions, a description of instruction set notation, a table of execution times for the various addressing modes. Then it splits up the instruction set into divisions such as 'load instructions', 'store instructions' etc. It shows the flags in the 'P' processor status register and the branches for testing them. There's a table of what flags are affected by the instruction set, and explanations of ANDing, ORing and EORing, and a description of the Stack. An explanation of the 6502 registers is there, and a description of addressing modes. The rest is just more lists of the instruction set – in numerical order (twice) and alphabetical order.

Our verdict – the cards cost £3.95 for the Vic and 64, and at that price we think they represent fair-to-good value. The 6502 card is a pound cheaper but we weren't so happy with it. You can get them from some retailers but the quickest solution will probably be a phone call to Elkan Electronics on 061-798 7613.

Two other points: why isn't Commodore providing this kind of reference card free of charge with the computers? Some other micro makers do. And second, we're halfway through preparing our own ready-reference cards: watch out for a special offer in the Christmas issue!

Specialising in 64 software

The Six-Four Supplies Company is a recent addition to the Commodore 64 scene, and if its first catalogue is anything to go by we can expect some interesting software of apparent quality from the firm.

Like there's C64-Forth, a version of the language that should offer the established implementations some competition – it's compatible with Fig-Forth and Forth-79, two of the better-established standards for Forth. Your £70 buys you a starter dictionary of over 300 command words, a loadable macro assembler for mixing Forth and machine code, what looks like a good set of program development facilities, and a 144-page manual (which helpfully includes Forth equivalents for Basic commands).

Six-Four Supplies has also picked up the UK distributorship for TOTL Software. That's a pleasant US company with a daft line in logos (infant chickens figure heavily); Honeyfold used to sell TOTL's stuff here but dropped it a while ago, and to tell the truth we weren't too impressed with what we saw. Maybe it's all been updated since then – we were playing with the packages quite a while ago.

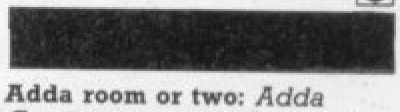
Anyway, TOTL's software includes the TOTL.TEXT word processor, a filing manager package that's rather more powerful than the name TOTL.LABEL suggests, a project planner covering time periods from 48 hours to four years called TOTL.TIME MANAGER (we didn't try that one), and a bibliographical reference package named RESEARCH ASSISTANT (particularly disappointing when we had a go on it).

Let's hope the TOTL stuff has improved. Also in the Six-Four list is a set of three music synthesis packages (Note Pro I for £20, an extended version called Note Pro II costing £35, and a transferrable machine code routine for your own programs called Note Pro Bridge at £20) and a cassette back-up program with the inspired name Backup for £15 (you have to promise you'll copy only your own programs!).

The company also has a couple of interesting 64-to-Pet extensions. One is cheap Pet Loader/Emulator (£15.50) which reconfigures the 64's memory to duplicate a Pet's, so programs will transfer happily even if they include POKEs and machine code.

The other is an upgrade for Basic V2 that gives it the commands of Basic V4 as used on the 500/700s and 8000s, particularly to allow the 64 to address 8000 series disks. This one is called C64-Link, and we've heard very good things about it. It costs £100, though ...

Six-Four Supplies doesn't seem to have a phone number, but the address is PO Box 19, Whitstable, Kent CT5 1TJ.



Adda room or two: *Adda Computers, one of Britain's leading Commodore retailers, has moved into an expanded new headquarters office in Ealing where its sales team is supported by a professional software group, a comprehensive training operation, and 24-hour maintenance services. Adda is probably the top Commodore dealer now — since the launch of the Pet in 1977 it has installed over 1,000 Commodore business systems.*



Ham radio update

The Dutch outfit Computer World makes (among other things) an RTTY interface for the Vic – Mike Todd reviewed it in the June Commodore User. Computer World has now come up with COM-IN 64 for the (would you believe) Commodore 64 which combines RTTY and other goodies.

In fact it can provide communications in Baudot for RTTY, Morse code, ASCII, half-duplex RS232, and SSTV (Slow Scan TV). There's a mini word processor in there too for message editing; disk, cassette and printer are all supported.

This is what it gives you:

- *RTTY:* receive and transmit "in almost every baud rate" with WRU, 80-character message buffer, 24-hour clock, split and full-screen 12K memory buffer, automatic word-wrap, replay, PTT switch adjustable shifts.
- *Morse:* transmit and recieve up to 99 words per minute with auto speed adjustment.
- *SSTV:* receive pictures with a resolution of 100 by 120 dots in step grey scale.
- *Modem:* automatic Bell/CCITT selection, 300 baud half duplex.
- *Wordprocessor mode:* memory of 12K bytes, full screen editor.
- *Mailbox:* can prepare incoming text with a WRU (Who aRe yoU) buffer and take action if a match is found. Another radio station can load and save one file to the computer from the receiver without operator intervention.
- *ASCII:* receive and transmit ASCII programs.

In all you get over 60 commands to use. And at £99 it must be worth looking at.

Flyover reprise: ***At last we've found out why the FLYOVER Victual dies after screen 7 — it's because the author never got as far as screen 7 himself. Add this line to keep the program going:***

```
8000 :IF SN>7 THEN SN=7
```

More 64 Business Software

Business accounting packages for the 64 are starting to roll in thick and fast. Kuma Computers sent us some info: Kuma already has a line of business software for Sharp micros under the generic name 'Solid State' (no, we don't know why) which is being converted to the 64 (and we don't blame them)

The impressive aspect is the modest pricing – the first two packages that Kuma has already cost only £24.50 including VAT. At that price you're getting cassettes, of course.

The Solid State Cassette Database gives up to 255 pages per file and ten lines of information per page; files can be split when they become over-large. You get the usual searches, browsing, sort and select, and print options; also in there is a calculator feature, and that's rare on cassette filing packages.

Solid State Non VAT Accounts is for any organisation or trader too small to warrant VAT registration. It provides month-by-month annual accounting (up to 50 entries per month) and allows up to ten headings each for expenditures and income (but only a combined maximum of 15 per file. Five income and five outgoings codes are provided. Entries can be sorted by date, searched for, amended, and printed.

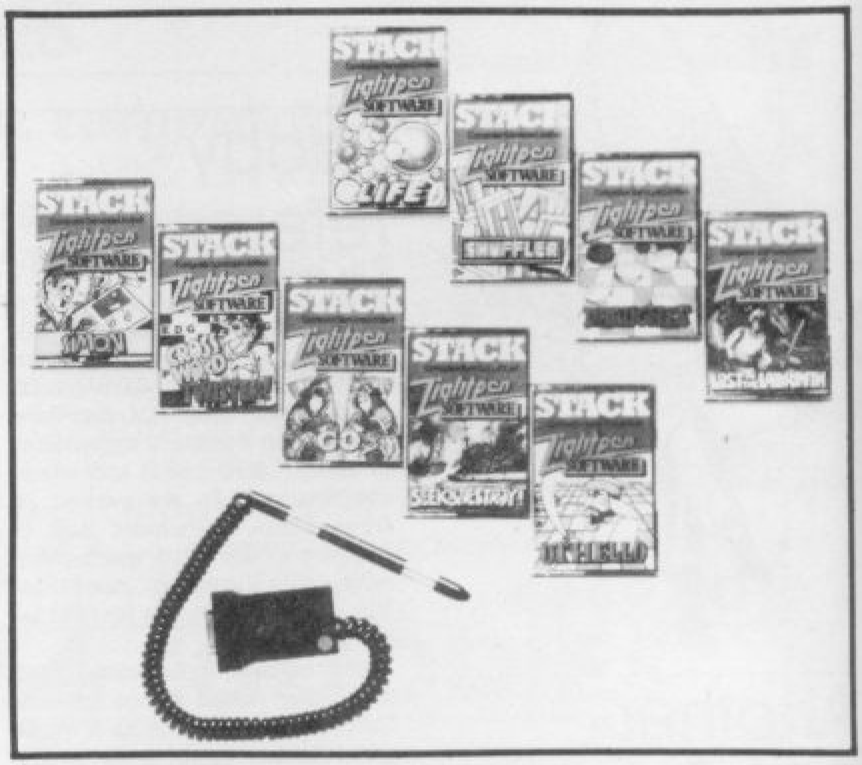
Kuma will have VAT accounts soon as well for £39.50, and there'll be a disk version of that one at £79.50. You can reach Kuma on 0628 71778.

Shop accounts

Another new accounts package for the 64 is Quick-Count's Book keeping System for Cash Traders. It's aimed particularly at shopkeepers and is built around a powerful Cash-Book Analyser and a Purchase Day Book. Daily Takings can also be entered to produce a Weekly Takings Summary, Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet. The VAT account is produced; retailers schemes A and B are calculated automatically.

The package could well be used by a consultant or tradesman whose sales day book is small; Alternatively, the system can be as a powerful cash book analyser.

It comes on cassette (disk optional) with an 81-page A5 user guide in hard covers. The price is £78 plus VAT, and Quick-Count says the software will be available from "most" Commodore dealers. Enquiries welcome to 01-202 5486.



Stack reckons it has "burst" into the games market "with the launch of 36, yes 36, software games" for the Stack Light Pens. Actually there are nine games for our machines – Vic and 64, also BBC and Atari. They're pretty good, though, and light pens represent a totally new concept: no joysticks, no fumbling with the keyboard.

We've also had a sneak preview of the Stack 'light gun' – an absolutely brilliant toy! The Stack Light Rifle is described as "the most exciting product to be aimed at the Christmas market this year".

The rifle can be used with the Vic 20 and Commodore 64, it comes with 12 ft of cable, and Stack says you can shoot at the screen from that distance (if your living room's big enough). We tried it from about 10 ft, and it works that far away.

Five games are already available for the rifle: and Stack says software houses are rushing in to develop even more gun-slinging programs for it. You'll get three games included in the £29.95 price anyway to soothe that itching trigger finger . . .



Power for 64

POWER is a powerful and well-loved writing utility that is already established on the Commodore 4000 and 8000 series. Essentially it's a Programmer's Aid with bells and whistles.

The good news is that Kobra is now selling POWER 64, a version for Commodore 64 users. It contains 14 commands to ease and speed up program-writing, things like AUTO and DEL – but also goodies like FIX and PTR (they restore Basic pointers) and WHY which helps identify the cause of an error.

POWER also contains facilities for controlling disk, another 13 commands including DEVICE, DISC, ERR, LIST, MERGE, RUN, LOAD, START and SIZE.

The complete package, available from Kobra or via most Commodore dealers, costs £69 plus VAT.

For further information contact: Kobra Micro Marketing, Farm Road, Henley-on-Thames, Oxon.

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We have fixed up special-offer deals for readers with a number of suppliers of Vic and 64 products. It's easy — and offers you substantial savings on a whole range of products!

Collect the appropriate number of coupons from successive issues of the magazine — the number you need varies from one supplier to another. When you have enough, to claim your discount you send off the coupons with a cheque or postal order to the supplier in question (NOT to us!). Addresses and more details next issue; meanwhile, get out your scissors!

Couldn't be easier, really, could it?

The deals

Voltmace collect two vouchers for a £1 discount on Voltmace joysticks. Normal price £5.95: special offer price with two vouchers £4.95.

Anik collect three vouchers for a £1.50 discount on Anik's *Yahtcee* and *California Gold Rush* games for the 64. Normal price £7.95: special offer price with three vouchers £6.45.

Computer Room collect three vouchers for a clearance offer on five Vic-20 games. Normal price £3.99 each: special offer price with three vouchers five for £5.00.

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Bytewell collect three vouchers for a 25 per cent discount on all advertised goods. See the ads, or ask for a catalogue.

Stack collect three vouchers for ten per cent off all Vic and 64 products — includes the Stack Light Rifle (RRP £29.95, voucher price £26): Light Pen (RRP £25, voucher price £22.50): 4-slot motherboard for Vic at £20.40, for 64 at £24.65: 8K Storeboard for Vic at £24.65. But remember to add 15 per cent VAT!

Parker

"To young eyes the world must seem a very exciting place," droned a deep Transamerican voice at the recent Parker Video Games launch. The Panavision screen splutters from Star Wars to James Bond, Spiderman, Action Man, Popeye. Yes, all the old and mouldies are here – and then, "This is the stuff today's dreams are made of". Sounds more like 'all your yesterdays'.

Parker Video Games isn't new; it's games cartridges are already available on games-only machines like the Atari 2600. Now it's translating most of the 17 titles offered on to Vic and the Commodore 64 .

The trouble with cartridge games, though, is that they're none too cheap – Parker games already cost a pocket-busting £30 and the price won't be going down.

The Parker strategy is expensive too and not very exciting; it's buying up the rights for the more popular arcade games, the ones that have already proved themselves like Frogger, (which we've heard of – and seen in a dozen versions); Q*Bert, Popeye, Tutankham (which we haven't heard of); and many more. Then there's adventure comic characters and box-office blockbusters like *Star Wars* and *Return of the Jedi*. Parker is basing no less than four games on these epic productions, and no wonder – the rights cost more than $4 million.

With Christmas drawing nigh, Parker programmers are working up a sweat to get games out on home computers. Dates are already being pushed back but the five games designated for the Vic should be about in time for the Christmas spending spree.

Star Wars fans will be disappointed though; Parker will only sa "there is a possibility" of bringing The Force to the Vic screen. More disappointments for Commodore 64 owners too – "we've got no firm plans for the 64", says a spokesman. The *Lord of the Rings* adventure game has been earmarked for the 64 and not the Vic; it's not a top seller and won't get priority.

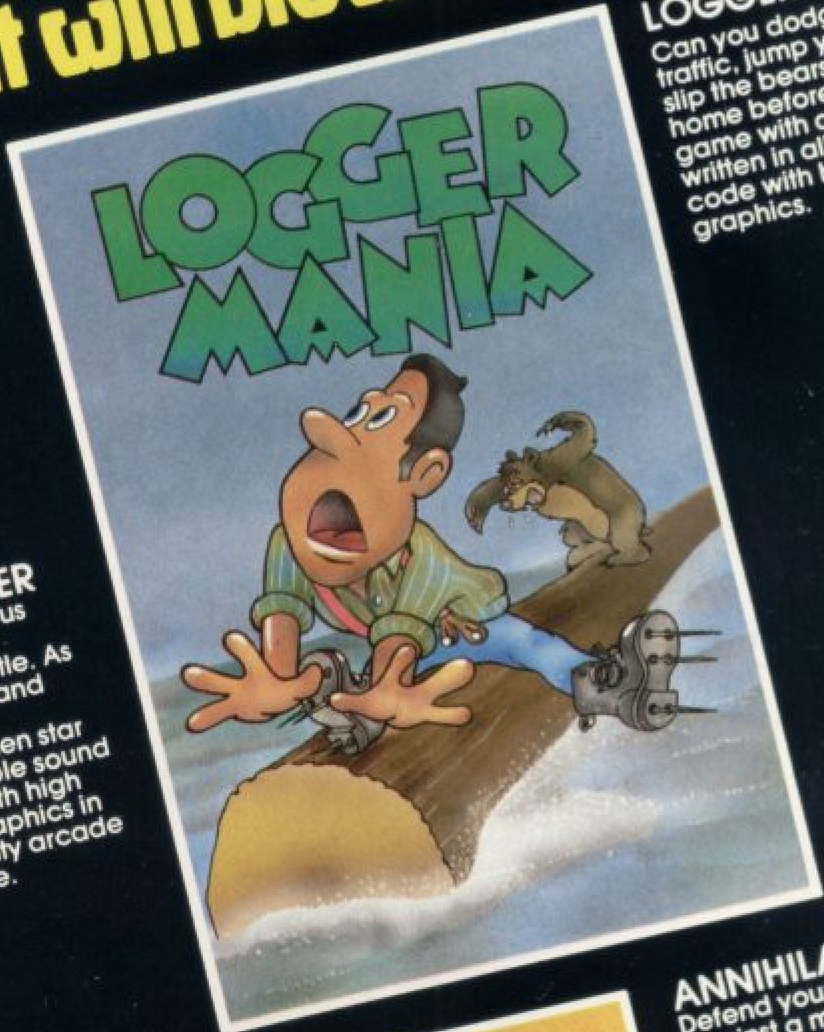
So to console yourself you can enter the Parker European Video Games Challenge, a knock-out contest on its arcade games like Frogger, Super Cobra and Popeye. Parker is planning ten regional heats, but to qualify you've got to prove your skill in public on "a special video games unit in selected major stores". The Finals will be in London in the Spring. The top prize – how about a trip to the States, taking in Cape Canaveral and the unavoidable Disneyworld? .


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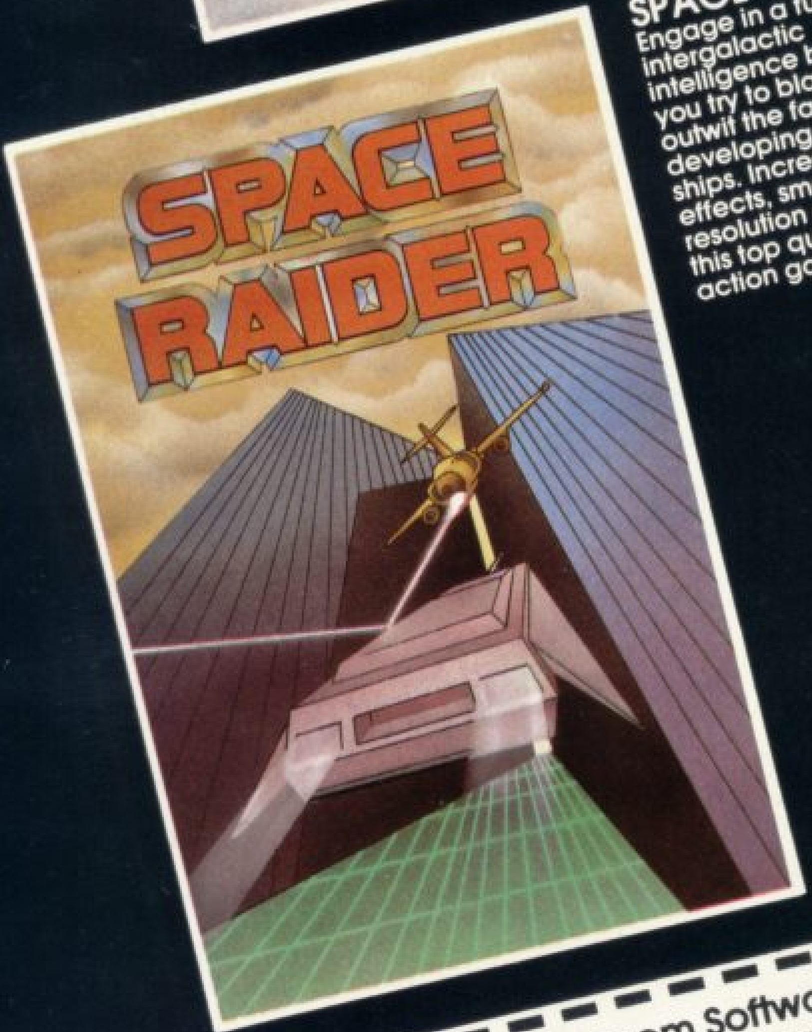
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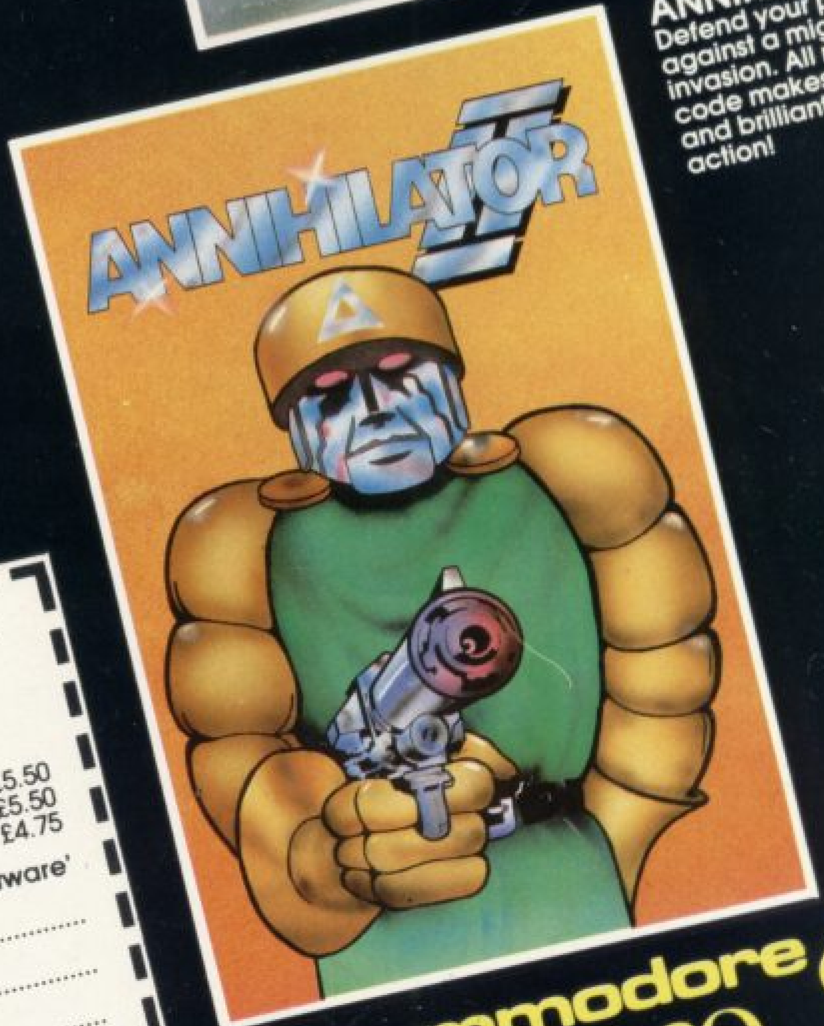
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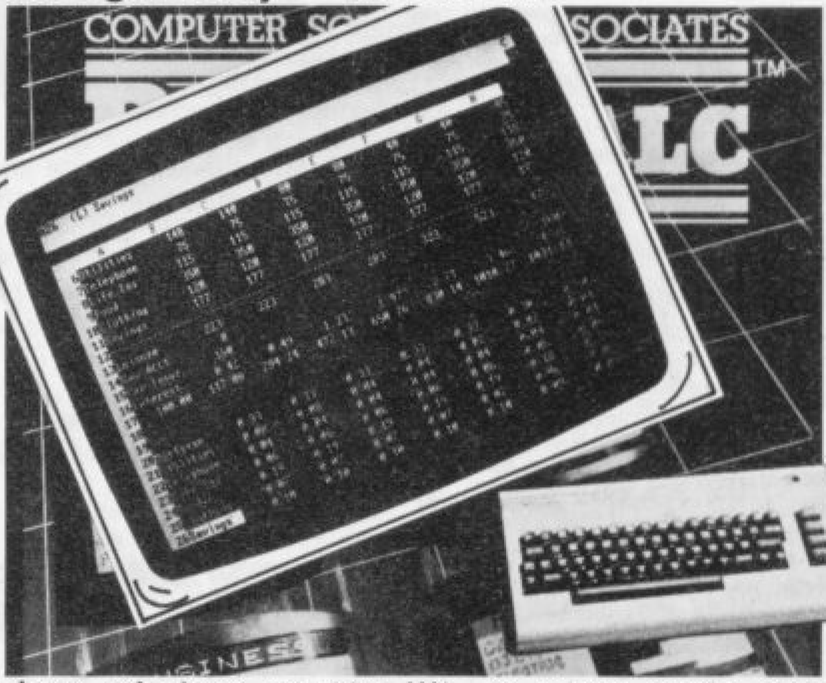
commodore 64
and VIC 20

The Spreadsheet Calculators

Introducing the instant future . . .

'Spreadsheet calculator' may be an intimidatingly clumsy term. But it happens to be one that should be part of most business computers today.

Businesses operate in a world of tight margins. But it is also a world of opportunities. And those two features make the spreadsheet package one of the most important tools in the computer's armoury. If you have a computer in your business and you don't have a spreadsheet package of some kind with it, you probably ought to acquire one right away — and use it!



There is no little competition for the title of 'world's best-selling software package'. But up there with the leaders is a package called VisiCalc.

It isn't *essential* to the operation of the computer, at least not in the same way as an operating system or a programming language are essential.

But VisiCalc and products like it have probably been more responsible for the success of the microcomputer than any other single factor.

Why? Because VisiCalc fulfilled two of the prime criteria for ready-to-use software on small computers — it did something genuinely *useful;* and it was genuinely *easy* to use. With VisiCalc, the micro in one bound became an instantly accessible tool for business and one whose cost-justification could be *immediate* and *visible*..

VisiCalc is no longer alone in its field, and many would argue that it is no longer the best of the breed in any case. But it set the standard — and all the contenders follow the same principles.

What's a spreadsheet?

A spreadsheet calculator is a load-and-go package that sets out a grid on the screen akin to the spreadsheet layouts used by bookkeepers and acountants: you can fill the grid with numbers and textual headings, and the package will perform calculations on them.

Many of these packages will have the word 'calc' in their name, which is as good a way as any of identifying them. Some will be called 'business planning' or 'financial modelling' package, though the latter term at least should probably be reserved for a rather more sophisticated genre of financial forecasting system.

It's also worth pointing out that you need no specialist accountancy or bookkeeping knowledge either.

The other critical element in their design is the provision of really quite sophisticated facilities for the analysis and manipulation of data.

So the spreadsheet calculator enables you to do all those financial and statistical calculations that might otherwise require ruled analysis sheets, a calculator or slide rule, and a pencil.

The spreadsheet calculations will include the kind of totalling of horizontal rows and vertical columns that all financial calculation seems to involve. But you can also call for much more complex arithmetic to be performed on your entries — discounting an investment across 12 months by a variable rate, for instance: summing only certain entries: working out averages or standard deviations.

In fact an electronic spreadsheet (or 'worksheet') is exactly analagous to the way most business planning and repetitive calculation is done. You would probably rule several columns down a sheet of paper and give them headings, say one per month. The rows across would be for the variables and they would have headings in the left-hand column.

You'd enter a value along the rows for each slot and probably use them in calculations that produce results along the bottom (like totals for each month) and in a right-hand column (totals per item for the whole period). Some of the rows and columns might hold subtotals, and there would probably be some annotation and comment dotted around the sheet.

To do an alternative set of calculations you would take a fresh sheet, put on the same headings and columns, enter a different set of figures, and repeat the calculations.

So you have a grid with slots in it for the insertion of particular values. Other slots provide for the results of calculations involving the values you enter. And the layout, the headings and the calculations will all be the same *even when you are trying out different numbers.*

The computerised spreadsheet calculator provides exactly that — with greater speed, more flexibility, more completeness, and probably better precision.

Today's advanced speadsheet packages demand no technical computer knowledge; and ease of use is one of the major points in their favour.

By contrast with non-computerised methods those spreadsheet calculations can also be considerably more complex, if that is required: the package will allow the use of formulae and conditional expressions to express complicated relationships between the figures and other data that you put into the spreadsheet.

But probably the most important attribute of the spreadsheet calculator is the way it can be set up independently of the entries you put into it. Because the entries on the worksheet may be computed in terms of the *relationships* between them rather than the actual values you've entered, the sheet itself exists *independently of the numbers on it.*

That means the data on the sheet is easily altered, replaced or deleted; and when you alter something, all the affected values are recalculated *automatically* using the same rules and formulae that you had applied to a previous set of values.

So a given situation can be worked out with different sets of information — in particular to answer 'what if' questions.

A simple example: you know what you have to add up to work out cost of sales, so you can set up a 'formula' that sums those entries. And by altering the actual numbers you put against those headings, you can see how the 'cost of sales' entry would change — for instance, you might check out the bottom-line effect of different wage increases to see just what you can afford to offer.

Or you could do it the other way around: with an adjustment to the formula you're using, you could try a target figure for cost of sales and see just what that means for the individual elements of the total cost.

Used like this, a spreadsheet calculator can take much of the guesswork out of forecasting and forward planning.

The Electronic Worksheet

When you use a spreadsheet package you specify the size of the worksheet to suit your own needs — the maximum will be something between 200 and 300 rows (with 256 the norm) by 60 to 80 columns (63 is a usual maximum), and it is rare to use all of that.

But until you hit those limits there is nothing rigid about the

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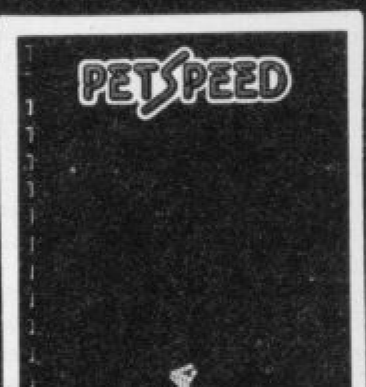
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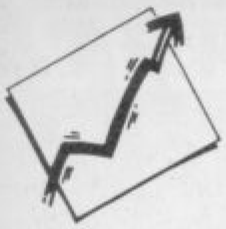
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INTEGER BASIC – This popular compiler can give the speed of real machine code (100 – 200 times) for programs that do not require floating point arithmetic. Integer BASIC is available for all PET's and as a cross compiler for the 64.

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worksheet grid: one of the really nice aspects of spreadsheet calculating is that you can add or delete rows and columns anywhere in the grid as you find the need, and ordinarily this won't affect any of the relationships you have already set up. So if you are summing all the value in a column from row 4 to row 7, and you add a new row within that range, the totalling formula previously defined should change automatically to sum rows 4 to 8.

The screen cannot display the full worksheet, naturally: there isn't enough space on it. Instead you get a 'display window' generally showing about 20 rows by eight columns. The cursor keys will move the window around the worksheet. You always know where you are because the row and column identifiers are always present on the screen.

You can also ask for certain rows, columns or both to be 'fixed' so that they don't move when you are rescrolling. This is handy for keeping headings on the screen. For instance, if you have a 24-month business plan and you want to take a look at the start of year two it would be useful to 'fix' column one (containing your entry headings) and the top couple of rows (with your month headings) on the screen.

This facility is typically used for titles, but it can also display a split screen for comparison of different figures. On some packages you can also split the screen into two horizontally or vertically divided sections that can be moved independently as two separate 'windows'.

As well as defining the overall shape of the grid, you also specify the size of each block (or 'cell') within it. At start-up the package will give a default block size, usually of eight characters; this you can alter, generally to a maximum of 80 or more.

You won't be able to *see* 100 characters in each entry, because that would make the grid undisplayable. Instead up to 27 or so will be displayed on the worksheet. But the *actual* contents of the block you're at will be shown in full somewhere on the bottom of the screen, and any calculations will certainly *use* the full contents of the block.

Rows will be numbered sequentially and columns will be identified by letter — once you get past 'Z' the columns will be named 'AA', 'AB' and so on: then 'BA', 'BB' etc. An individual block is identified with by column and row position, so 'G9' is the ninth block down the seventh column. When you're moving the cursor around the worksheet, the current block (the one that the cursor is at) will always be identified at the top or bottom of the screen on a line containing status and command information. And one of those commands available to you is a 'go to' instruction that will take you *directly* to a specified block.

Setting up the worksheet

The information you put into a block can be **text,** for headings, descriptions and notes. In this case the block will be ignored for the purposes of calculation.

Most entries will be **numeric,** and for each block or row or column (or the whole worksheet, indeed) you can probably specify a format for the contents as being *integer, decimal*, or *exponent* form (scientific notation). The numeric precision is likely to be of the order of 12 to 16 digits plus decimal point or exponent sign. A 'financial' format to two decimal places and rounded to the nearest cent or penny is also the norm.

Another formatting option you usually get is *justification* — whether the block's contents butt against the left or the right-hand side. Again, this can generally be set for the entire sheet or for individual columns, rows or blocks. Personally I find the most convenient format for business forecasting is to justify all the numeric entries (which are in the 'financial' format) to the right, with rows and columns containing titles and headings justified to the left.

In a block you can also set up a ***formula***, a calculation that may involve other blocks. The results will then be entered automatically. For instance, BB9 could be specified as holding the total you get by adding the contents of blocks BB1 to BB8. In that way, BB9 will always carry that total — even when the actual values being summed are changed by you.

With these formulae the spreadsheet calculator can add, subtract, multiply or divide the values at two or more blocks. It will probably be able to find partial sums, work out minimum and maximum ranges, and calculate square roots. Some packages also have commands for 'conditional' operations involving comparisons.

Using a formula

In fact the formula can use specific values ('0.15' for a VAT calculation, for example): the contents of other blocks: constants (some packages allow you to define constants yourself, so you might set up one called 'V' having the value '0.15' to use in your VAT calculations): and a whole range of built-in functions.

Those may be combined in one formula by using arithmetic and relational operators, with brackets if necessary to ensure the correct order of calculation.

As a result the formula in one block can be really quite complicated; and it can take a while to get it right. But thereafter it is extraordinarily gratifying to see just how easy it is to produce a correct value at the appropriate place in the worksheet from a complex calculation — and how easy it is to get to the 'what if' result simply by altering the values used in the computation.

Blocks, rows and columns can be moved around the worksheet, copied and repeated. All the contents of the blocks will be moved, and if that happens to involve a formula the calculation at the new location will operate on the equivalent blocks. Say you're copying that BB9 block to AZ12; it contains a formula which sums the values in the eight blocks immediately above it so at the new location it will sum AZ4 to AZ11.

When you set up a formula in a block it's the value computed by the formula that appears on the worksheet. The formula itself will appear outside the worksheet in one of the information lines.

There it can be edited and amended. Your spreadsheet calculator package will include a set of editing commands that do not require you to retype the whole entry for a formula; they can also be used on text and on absolute numeric values.

Links to other packages

Spreadsheeting *per se* is a useful function, but the kind of standard facilities provided are rarely enough. In particular you might want to present the results in some other format than the grid: you might want a graphic representation. Bar-charts, graphs, or pie-charts make for a more visual and more immediate summary of the facts; trends and critical areas are more obviously highlighted.

Most of the packages have a built-in option to replace actual numbers with a bar of asterisks at specified points in the spreadsheets, and this does give a rough means of instant comparison. But the bars are not solid, they can only be shown in the horizontal plane, all the other information on the sheet will still be present (unless you create a separate worksheet containing only those values), the proportional precision of the bar-graph is limited by the number of character spaces allowed in the cell, and the maximum length of the bar is also restricted by the size of the cell.

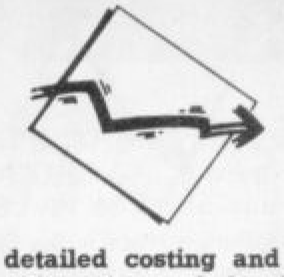
The solution is a link to another package, one that can take specified information from a worksheet and format it appropriately. Several of the business graphics packages can do this.

The other common requirement is to incorporate data from a spreadsheet into a document — a report, for instance. Several spreadsheet calculators can be run with and called directly from a word processing package with information from the worksheet being inserted automatically into documents produced by the word processor. Again, this generally operates by setting up a partial file in a WP format containing those sections of the worksheet that you want to utilise in your document: you load and run the word processor, calling in the spreadsheet data as required.

There are a few packages on the market which combine several functions — spreadsheeting, full business graphic presentation, word processing facilities. One or two also add the other widely used element of business computing, a file manager.

By comparison with the use of different packages for these different functions, though, the all-in packages tend to suffer from problems of performance. They are simply too big and provide too many options for the computer to sort through every time it offers the user a choice.

The result? You'll probably need expansion memory: the facilities you get won't be as elegant as those in the purpose-designed packages: and the overall operation is likely to be much slower.



On the other hand, some movement among the software developers *is* visible and the latest crop of 'hybrid' packages do represent a major advance.

Spreadsheet commands

All spreadsheet calculators give the user a set of commands for setting up the worksheet, manipulating it, and housekeeping. The terms used for commands and the way they are used varies from one package to another, but commands are generally preceded by a slash and the initial letter only is typed.

Format specifies a format for one or more blocks, a whole row or column, or the entire worksheet. Options vailable will include resetting the column width: left- or right-justification: decimal, integer, exponent or financial layout for numbers.

Global sets options for the whole worksheet. Functions mere may include the display of all formulae in the blocks instead of values; a 'border' command to set or suppress the display of row and column identification; and skipping over empty or protected blocks.

Edit allows you to amend the contents of a block, using cursor controls, deletion, overtyping, and insertion.

Insert adds a new column or row.

Move shifts a row or column to a new location.

Copy takes a one-to-one copy of one or more blocks, replicating either the actual contents or the formulae as required.

Replicate operates similarly except that it copies into a destination larger than the source, so it can be used for multiple copies.

Protect prohibits any change tothe content or format of one or more blocks. An Unprotect command cancels this.

Calendar automatically calculates and enters dates and time periods.

Blank erases the contents of a block, column or row as specified.

Delete removes a whole column or row.

Load selects a specified worksheet from disk.

Save writes all or part of the current worksheet to disk — either as its contents alone or with both values and formulae.

Print prints all or part of the worksheet. As with 'save', you will be able to specify blocks for the start and end of an operation on a partial worksheet.

Title locks columns, rows or both into position on the screen so that they remain static while the display window can move around the worksheet.

Window splits the display window into two. Each can usually have its own format settings and can be scrolled independently.

Clear clears all contents and format settings. Some spreadsheet packages have engaging names like Zap or Kill for this function.

End leaves the package and returns you to the operating system — preferably having first given you the option of saving the current worksheet.

Using a formula

ABS uses the absolute value of a specified item

COUNT finds the number of non-blank entries in a list of values

ERROR identifies all blocks with the function specified, and all blocks with formulae relating to them

EXP uses the exponent of 'e'

REGR performs linear regression on a specified range of items

PROJ calculates the best estimate of dependent variables

DEPD calculates the best estimate of independent variables

SLOPE computes the slope of the linear equation from the results of a regression

OR compares two expressions, results in 'true' if either is true

AND compares two expressions, results in 'true' if both are true

NOT compares two expressions, results in 'true' if both are false

IF if expression 1 is true, use expression 2; otherwise use expression3

INT uses the integer portion of a value

LOCKUP search a specified row or column for last value equal to or less than the search value given

LN uses the natural logarithm of the value

LOG10 uses log to base 10

MAX finds and uses the maximum value in a specified list of items

MIN finds and uses the minimum value

SUM sums the values in a list

NPV calculates the net present value of a specified range of items at the given rate of discount

PI uses the constant *pi* (generally to 16 significant digits)

SIN calculations a sine value

COS cosine value

TAN tangent value

ASIN arc sine value

ACOS arc cosine value

ATAN arc tangent value

SQRT calculates the square root

Using a function

Spreadsheet calculating has applications within virtually any organisation. Classic uses for it include these:

- **financial forecasting and business planning, with alternative scenarios being considered**
- **detailed costing and consideration of business propositions**
- **rate-of-return calculations**
- **assessment of bread-even points**
- **alternative pricing strategies**
- **manpower assignment and other resource scheduling**
- **calculating depreciation and loan write-off periods**
- **profit-and-loss statements and balance sheets**
- **preparation of budgets and comparision of actual performance against budgets**
- **computation and presentation of results for market research and other surveys**
- **analysis of laboratory experiments**

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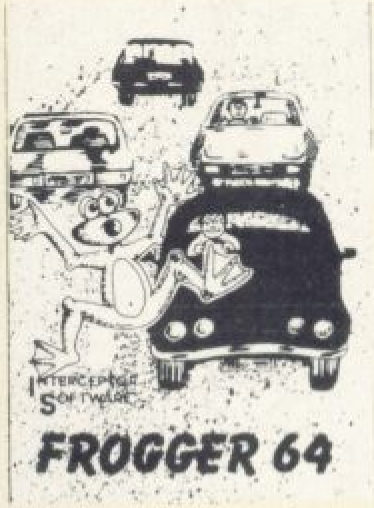
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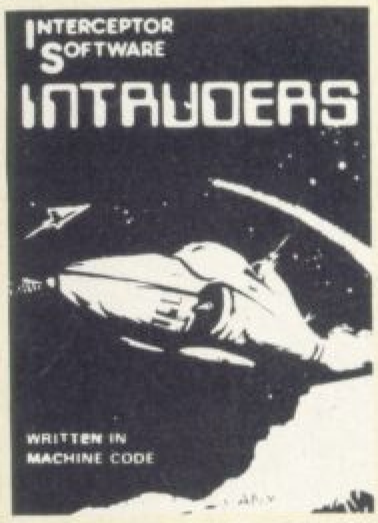












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Liberation from the screen!

Printers for rich and poor

There's obviously a lot more you can do with your Vic or 64 just by adding a few peripherals. A printer, for instance, could be the most valuable addition you make to your system — and one of the most expensive too.

It will be on top of your list if you're a keen programmer and you want to see printed copies of your painstaking and no doubt brilliant programs.

A printer can be great fun, though, because you're using your machine to control a quite sophisticated mechanical device and produce something you can move around — you might say it liberates you from the screen.

There's a wide and sometimes baffling range of printers even at this humble end of the market. Commodore for one produces printers for all its computers — but you don't necessarily have to buy Commodore. Then there's the different types of print systems to think about, the most popular being dot matrix and daisywheel. Bohdan Buciak runs through the options available.

The easiest and cheapest printer in the Commodore range is the 1515 – easiest because there are no interfacing problems, but more about those later. Although it's been superceded by the newer 1525, there are still plenty of them available in the shops; you could pick one up for around £230. The newer 1525 costs about the same, though, and both can be used on the Vic and the Commodore 64.

Like the 1525, the 1515 is a dot matrix printer. That means it works by pushing a pattern or matrix of tiny needles against an inked ribbon and hammering the ribbon on to the paper to produce a character shape, just as the Vic puts characters on to the TV screen – but on the printer the matrix of dots is five wide by seven high.

The 1515 is a compact little machine and it looks a little odd compared with some of the other printers around mainly because it's five inches high – but what does that matter?

Plus points

The great advantage of Commodore printers is that they will print anything you're able to put on the screen – upper- and lower-case letters, the Vic's standard graphics, even your own user-defined shapes. (Commodore machines have an unusual character set and you may not be able to produce all of them on a non-Commodore printer.)

The 1515 and 1525 can print 'reversed' too, so the characters come out as white shapes on a dense black background; and they can print double-width characters for headings (or just plain readability).

The 1515 doesn't print very quickly though; Commodore says it can manage 30 characters per second, but you can take those figures as lightly as the ones car manufacturers produce for petrol consumption – they always use 'optimum' conditions.

It only prints from left to right too, which means that it has to drag the print head back across the page to start the next line. Some printers print bi-directionally which cuts out the return delay.

Paper

What about paper? The 1515 uses continuous 'fanfold' stationery, which is just a long length of paper perforated at the page ends and folded into the box like a huge concertina – you can get boxes of 500, 1,000 or 2,000 sheets.

The paper has holes along both the vertical edges which fit into sprocket teeth at the point where the paper is fed in. These teeth pull the paper through the machine keeping it perfectly aligned.

You can use any width from 4.25 to 8.5 ins. This width includes the holes on either side so the page will be smaller when you've pulled the dots off. Still, it lets you print up to 80 characters per line ... which is all the 1515 can handle.

One disadvantage of this mechanism is that you can't easily use single sheets. Unlike most other printers, the 1515 doesn't provide roller or friction feed, like the rollers on a typewriter which grip the paper and roll it through.

We reviewed the 1515 in considerable depth back in **Vic Computing's** *April 1982 issue; there's a follow-on piece with a more personal view from Mike Grace in the October 1982 magazine.*

Using the 1500s

The 1525 won't let you use single sheets either, but it does use wider and more standard paper – sheets that measure 15 by 11 ins after the perforated strips have been torn off. Most dealers are stocking it now, some in preference to the 1515, because it's a much neater and modern-looking machine – it prints larger and much more legible characters too.

Both these printers are easy enough to use – eventually. But before you can start printing you've got to tell the Vic to open a link.

This is done by using an OPEN command followed by a logical file number and a device number. The device number for the printer is '4'. You could choose any number from 1 to 255 as the logical file number.

It's difficult to explain what a logical file is; there doesn't seem much point to it except that you need to specify one so that you can print. By the way, you must also use a CLOSE command, specifying the same logical file number before you can carry on to do anything else.

Commodore has announced two more low price printers for the Vic and 64; but as usual with Commodore announcements you'll probably have forgotten about them by the time they appear.

There's a new colour plotter on the way, the 1520, which plots graphs and histograms in four different colours: we've got an advance unit and we're trying to persuade it to work. Its print speed for characters and numbers suffers from the availability of colour – it's a sluggish 14 characters per second. It'll cost you £170 . . . when Commodore actually lets you buy one.

A much speedier entrant will be the 1526, another dot matrix printer which races along at 60 characters per second – bi-directionally too. It'll cost a whopping £345 though, and you still won't be able to print single sheets of paper as it's only got a tractor-feed mechanism. It looks much nicer than the earlier models and its perspex hood does more to dampen that terrible screeching sound you get from all matrix printers (and especially the 1515!)

It's also got a programmable character facility, "so you can design your own characters, symbols or logo" says Commodore.

Alternatives

But enough of Commodore; what about the alternatives?

The easy to use ones first: **DRG** is about the only UK suplier with plug-in-and-print alternatives to Commodore's machines. In fact, they nearly are Commodore machines because DRG gets them from the same Japanese manufacturer, Seikosha.

DRG is offering the Seikosha

GP100VC, a specially adapted version of the GP100A, for £230. Why specially adapted? Two reasons: the Vic and 64 have a rather peculiar character set which some printers may not be able to produce, and they both use a non-standard version of the IEEE interface.

This needs a little explanation. IEEE is in theory a parallel interface. That means information travels along it eight bits at a time (along eight wires) rather than one bit at a time – which is how you'd define a serial interface, one bit arriving after another (the most popular standard version of this is usually referred to as RS232).

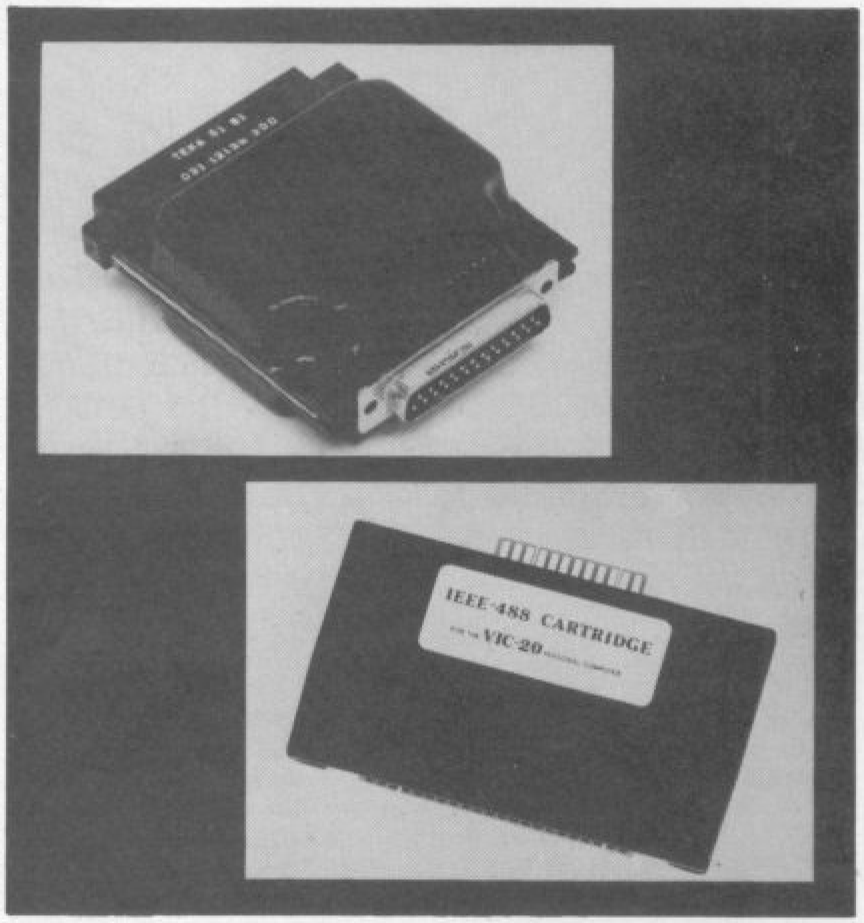
But Commodore's IEEE interface on the Vic and 64 sends stuff just like a serial interface – one bit at a time. And it's thoroughly confusing. You can overcome this problem with plug-in adaptors which usually need software, so that you can use different printers.

Getting back to the Seikosha GP100VC, you plug it in as easily as the 1515/1525. You get 30 characters per second and a full representation of Vic graphics – but it costs the same as the Commodore models, so what's the point? We asked DRG that question and it didn't have an answer: our only thought is that you might find a DRG Seikosha if Commodore's printers are in short supply.

Your friendly neighbourhood Sinclair

For really cheap printing you could buy the **Sinclair** Microprinter, a bargain at about £45. But, as we've just explained, you can't just plug in and go; you'll need to make a connection between Commodore's IEEE interface and the modified Centronics interface used by Sinclair. It's not as difficult as it sounds; you just buy the Printerface from **Softex Computers.** There are versions for both the Vic and 64.

The Printerface consists of conversion software on cassette and a cable with appropriate connector. That costs £20.95 but you'll also need the Sinclair power supply to run the printer. The Microprinter uses special silver coated paper which is only 4 ins wide so you'll only get 43 characters per line. The print system is rather unique though; it's a stylus (two to be precise) which scorches the silvering off



Two from Stack: the IEEE cartridge fits the memory expansion port and costs £39, the lumpy one is the RS232 adapter at £29

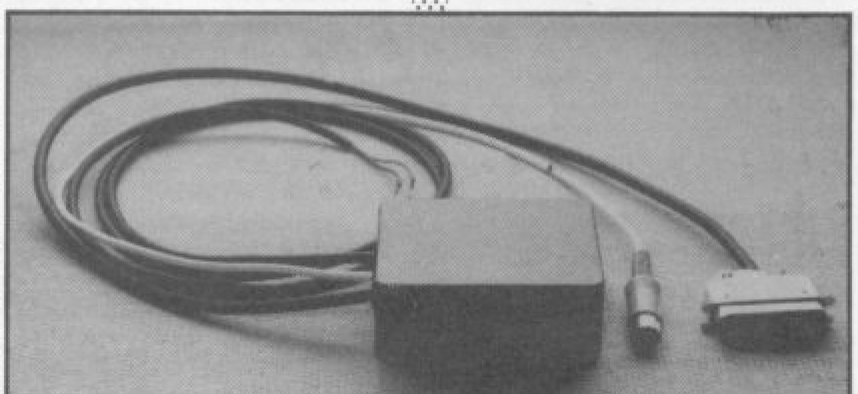
the paper and builds characters in horizontal lines, one line at a time as it passes across the paper. It's a very cheap alternative to the 1515/1525 and it seems to print better graphics too.

Quality dot-matrix

The Sinclair Microprinter obviously won't do if you're thinking of printing letters or any other correspondance quality text. It produces a pretty coarse print image. Daisywheel printers are most frequently used for the kind of work that demands better quality: but good ones can be pretty expensive and the cheaper models that are now becoming available are rather slow.

So you may decide you could get by with a good quality dot matrix printer. The Shinwa CP80, for instance, uses a 13 by 9 matrix so the characters it produces look much more dense and formed.

It costs £299 and for that you get 80 characters per second, tractor and single sheet feed. (By the way, the Shinwa CP80 is identical to the CTI CP80 which **Chromasonic** sells for £332 – apparently its real name is the Shinwa CTI CP80, but that's a bit of a mouthful.)



The Ibek interface — about £71 for a Centronics-type connection

Computers of Wigmore Street in London, which also sells the machine, says it can be linked to both the Vic and the Commodore 64 with its Tripler interface. This is a cartridge which slots into the user port, converting Commodore IEEE to the Centronics interface which the Shinwa machine uses (Centronics is an alternative form of parallel interface to IEEE – many printers use it, very few actually have the IEEE one).

Tripler comes complete with cable and costs £48.30 for the Vic and £51.75 for the 64 version. Since most dot matrix printers use the Centronics interface, Tripler opens up quite a wide range. Watch out for the graphics though – some matrix printers can't manage all the shapes the Vic or 64 can produce.

Interfaces

There are plenty of cartridge type interfaces like Tripler around. Another one is manufactured by **DAMS,** called the DAMS 488. This allows you to interface to any standard IEEE device. So you could use it to attach a disk drive as well as a printer.

The cartridge alone costs £59.95 and you'll need to buy the cable as well – which could cost another £30.

To connect a disk drive *and* a printer, you'll need yet another cable: more spaghetti around the table, less money in your bank.

Could you do it for less money then? Yes, by using software on tape rather than cartridge. **Audiogenic** has a tape-based interface written in machine code and a cable which plugs into the user port.

The tape costs £7.95 and its great advantage is that Vic software is contained on one side, with a 64 version on the other. The cable, though, is a little more expensive at another £20.

Using this, you can plug into any Centronics-based printer: but, again, you may have problems with upper and lower case characters.

There's a similar but cheaper device available from **Stack Computer Services** which allows the Commodore 64 to be used with parallel printers. Stack makes IEEE and Centronics versions.

The IEEE interface is a cartridge which plugs into the memory expansion port. It costs £39, and like the other Stack

interfaces it's the same price for both the Vic and 64. You'll need to buy some cable separately though.

The same goes for the Centronics interface – which is cheaper at £18 because the software is all on cassette (there's a floppy disk version which is a little extra at £27).

And then there's the Stack RS232 interface which is a cartridge that plugs into the User Port. This costs £29 and again you'll have to buy the cable separately.

Pros and cons

Granted, tape based interfaces are cheaper than cartridges; but they do have a few disadvantages. For a start the program on the tape is stored in RAM; so it inevitably affects machine code routines in the locations it occupies. You may have problems with both types of interface, though, if you're using a longish program that produces your printing – because both types of interface adaptor will take up RAM space.

How about some kind of adaptor device that doesn't affect your computer at all? Well, you could buy Interpod from **Oxford Computer Services** – which, by the way, has just dropped the price to £99.95. Interpod is really a 6502 computer in a box, which means that it doesn't affect the computer's memory.

It takes input from the Vic's or 64's built-in IEEE serial port (the one you'd plug a disk drive or a Commodore printer into): but it doesn't prevent anything else using that port, because there's a serial port duplicated on the Interpod box itself.

Admittedly it's going to cost you lots of money; but it's claimed to work with any software – which opens up a lot of horizons if you're using the 64 for business, for instance.

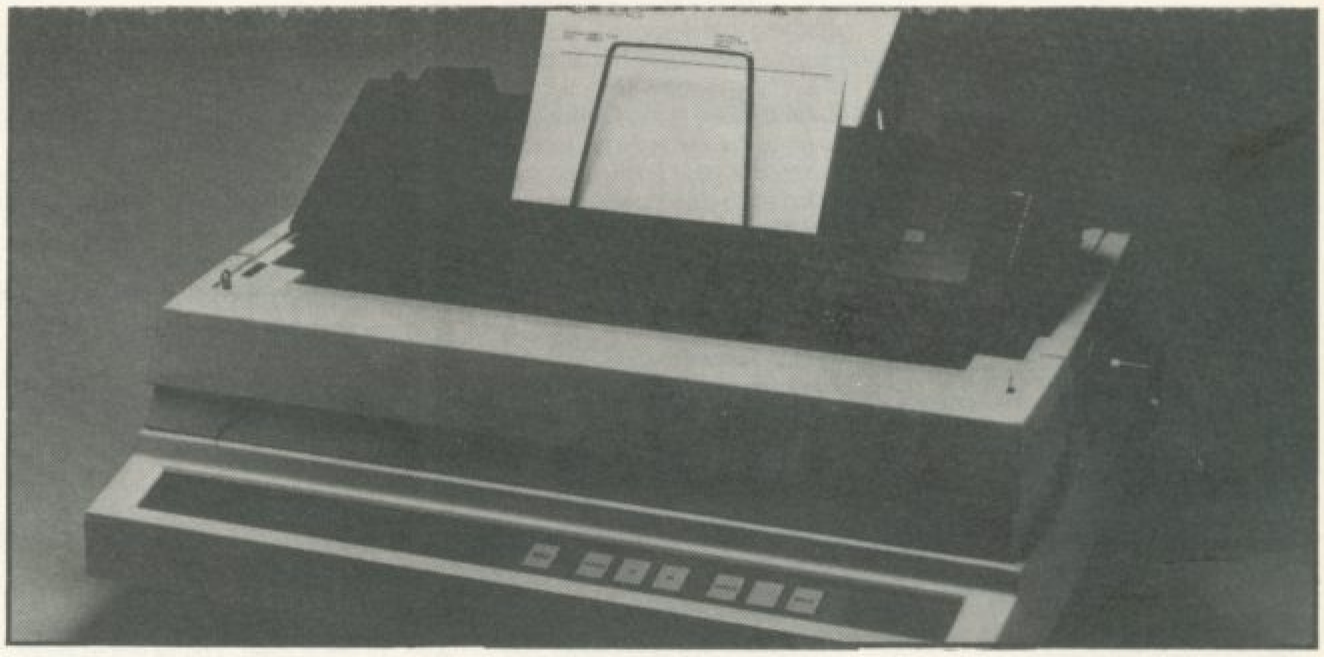
For printing, Interpod can link any IEEE or RS232 printer to the Vic or 64. RS232 could be useful because some daisywheel printers only have an RS232 interface (a few now support Centronics as well – but Interpod doesn't handle that).

A quick word about RS232. The Vic and 64 do have an RS232 interface built into them as well as IEEE ... but as with the IEEE implementation it's not a standard version of RS232.

You can write programs that will print on to an RS232 printer – but you'll need Jim Butterfield and Jim Law's piece from the August 1982 issue of **Vic Computing** to tell you exactly how.

And you might also need their follow-up piece in October 1982, because the hardware connections and the cabling required to actually plug in a printer will probably have to be made up specially ...

There are quite a few word processing packages around for the 64 now. So you might decide you need a daisywheel printer because it will give you better quality print. So how does a daisywheel printer work?



Probably the top-selling daisywheel printer — Diablo's model 630.

Printing with daisies

Daisywheel printers use a completely different system to dot matrix – they use pre-formed characters like a typewriter's instead of building them with dots. The characters are fixed on a spoked wheel which revolves at high speed, being hit against an inked ribbon by a hammer. The wheel is removeable so you can choose which typeface you want from a wide range of options.

Daisywheel printers, especially the cheaper ones, are pretty slow and you'll probably pay up to £1,000 for a machine with print speeds comparable to even a slowish matrix printer. The **Commodore** 6400P, for example, prints bi-directionally at 40 characters per second – but it will cost £995. (Actually it's a rebadged version of the Diablo daisywheel which is one of the two top-sellers in the general daisywheel printer market.)

Daisywheel manufacturers have realised that there's a huge market for daisywheel printers if they can keep the cost down, but the £500 barrier is only just beginning to break.

The earliest sub-£500 machine was the **Smith Corona** TPI which is still available from **Discom** at £485. The TPI gives you Centronics and RS232 interfaces as standard with an option for RS232.

The TPI, although it chugs along at a lowly 12 characters per second, is a true daisywheel printer. Another example is the **Brother** HR15, a little more expensive at £540: it's got about the same rated print speed as the TPI but it works bi-directionally – which makes it that bit quicker in practice.

Converted typewriters

Most other daisywheels in this range are converted electronic typewriters. Discom, for example, sells the Ultra 21 portable typewriter for £395: it has a Centronics interface that allows it to be used as a printer.

Another is the **Silver Reed** EX44 which, like the Ultra 21, is a portable. Silver Reed will supply only a Centronics interface, the complete package will cost you about £500.

If you've got an IBM Selectric 'golfball' typewriter – there are thousands of them around, or you may be able to pick one up cheaply from *Exchange & Mart* – you might be interested in the Printer-Adaptor from **Potopiddan UK.** (Ok, we know it's a funny name, it's Dutch actually.)

This device supports both RS232 and Centronics interfaces and lets you use your 'golfball' as a printer. You'll need a degree of technical knowledge to fit it, but instructions are provided.

Be warned, though – old-style IBM typewriters aren't designed for the kind of continuous printing that computers (even the Vic and 64!) will generate ...

You'll have gathered by now that nobody's developed a daisywheel printer yet that interfaces directly with the 64. DRG told us that something along those lines should be on its way soon from Seikosha but, apart from that, the future for simple plug-in-and-go daisywheels for the 64 looks glum.

You'll need to buy one of the interface devices mentioned above, and then have fun trying to get your machine to print all the characters. Don't expect too much advice either – many companies steer clear of the 64 because of its unusual interfacing requirements.

More information from these numbers – most will have local distributors:

Audiogenic	0734 586 334
Brother	061-330 6531
Chromasonic	01-263 9493
Computers of Wigmore Street	01-486 0373
DAMS	051-548 7111
Discom	0386 3591
DRG Business Machines	0934 419914
Oxford Computer Services	0993 812700
Potoppidan UK	041-889 4359
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Softex Computers	0202 422028
Stack	051-933 5511

Games Reviewed

a regular collection

ABDUCTOR
Llamasoft
Unexpanded, Joystick only
Price £6

This is Llamasofts's version of Galaxians, although there are some unique features. Lines of aliens sweep around the screen and up form the ground. You shoot at them with a fairly typical spaceship while trying to avoid being rammed: the aliens attempt to steal your humanoids who stand on the ground. If they succeed, they throw their (deadly!) skulls back at you. Sounds simple? All this happens at Llamasoft's usual greased lightning speed, keeping your firing finger very busy. If you survive until the fourth wave, your ship grows an extra cannon, doubling your firepower. Graphics and sound are excellent: but the game is incredibly difficult even for the early frames, so all but arcade freaks may soon lose interest.

Llamasoft, 49 Mount Pleasant, Tadley, Hants.

Presentation: ■■■
Skill level: ■■■■■
Interest: ■■■
Value for Money: ■■■

ANNIHILATOR
Rabbit Software
Unexpanded, Joystick or Keyboard
Price: £5.99

Yet another version of *Defender*, but not a particularly good example. Various types of alien move in from the right hand side of the screen over a rather crude, mountainous terrain. You manoeuver your spaceship, shooting at the approaching aliens, and that's about all there is to it. The graphics are a little jerky and the game is very noisy (thank heavens for the volume control knob); one nice feature, however, is that the game steadily increases in difficulty (the number and speed of the aliens) so that a newcomer can enjoy it as much as a more experienced player.

Rabbit Software, 380 Station Road, Harrow, Middlesex.

Presentation: ■■■
Skill level: ■■
Interest: ■■
Value for Money: ■■

ASTRAL ZONE
Channel 8 Software
Commodore 64
Joystick
Price £9.95

Not too much fun here: *Astral Zone* is another space-ship zapping game described as 'arcade' and '3D', but the graphics are really plain (despite use of sprites) and pretty boring. It is difficult to play but not by degrees. So you'll need a great deal of patience if you've not hit anything by the time *Coronation Street* comes on.

You're equipped with two neutronium cannons with which to destroy funny shapes that are supposed to look like fighters and cruisers. The usual alien photons appear occasionally to do you some damage.

Using the joystick, you can scroll in any direction. But you can't go very far up or down, and the terrain looks the same wherever you are – so what's the point? Another gripe is that the blurb doesn't explain the game too well – or perhaps there isn't really much there. At least the sound effects are reasonable enough.

Presentation: ■■
Skill level: ■■■■■
Interest: ■■
Value for Money: ■■



EXTERMINATOR
Bubble Bus
Commodore 64
Joystick or keyboard
Price £5.99

This is an adaptation of the ever-popular arcade game *Caterpillar*. As such, it is a faithful reproduction and very fast.

Bugs crawl down from the top of the screen. You've got to shoot them before they reach the bottom of the screen. When they get there, they mill around creating confusion and yet more bugs. Added to this conundrum are scorpions, eagles, tarantulas and other nasties out to get you.

The next level appears if and when the screen is cleared, and you go through the de-bugging operation all over again – but this time it's faster. It's suprising, perhaps, but doing it all over again *doesn't* become boring: and the sher speed of the action keeps your nose firmly pressed to the screen. It's a good fast-shot game but you won't need too much brain matter to play it.

Presentation: ■■■
Skill level: ■■■
Interest: ■■■■
Value for Money: ■■■■

GRIDDER
Terminal Software
Unexpanded, Joystick or keyboard
Price: £7.95

Once loaded, the game presents you with an irregularly shaped grid divided into squares. The object of the game is to steer your ship around the squares to colour them in and score points. There is a snag – an alien lurks on the grid and will give chase once he sees you, but if you are cunning you can lose him. Once you fill in a grid, a different-shaped one is presented: and if you are very good, two aliens are eventually present – an almost impossible problem. This game uses simple but adequate graphics. And although the concept is relatively unsophisticated, skill levels increase steadily through the game so your interest is maintained. One criticism is the



absence of instructions on the cassette box; they are provided on the screen during loading, which results in a long and cumbersome loading procedure.

Terminal Software, 28 Church Lane, Prestwich, Manchester.

Presentation: ■■
Skill level: ■■■
Interest: ■■■
Value for Money: ■■■

GRIDRUNNER
Llamasoft
+Unexpanded, Joystick only
Price: £6

Wow! This is surely the most that has ever been crammed into the 3.5K of the unexpanded Vic, and is a real must for enthusiasts of fast arcade action. You are a spacecraft patrolling a grid and zapping the centipede-like droids criss-crossing the grid to crash into you. Each time you shoot a droid segment it turns into a pod which evolves in time, finally sending a bolt of lethal energy down the grid. As if that isn't enough, beware of the X-Y Zapper moving across the grid firing lasers. Confused? Don't worry, the instructions are excellent as are the sound and graphics. The game is totally addictive, but great fun.

Llamasoft, 49 Mount Pleasant, Tadley, Hants.

Presentation: ■■■■■
Skill level: ■■■■
Interest: ■■■■
Value for Money: ■■■■■

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Dragon
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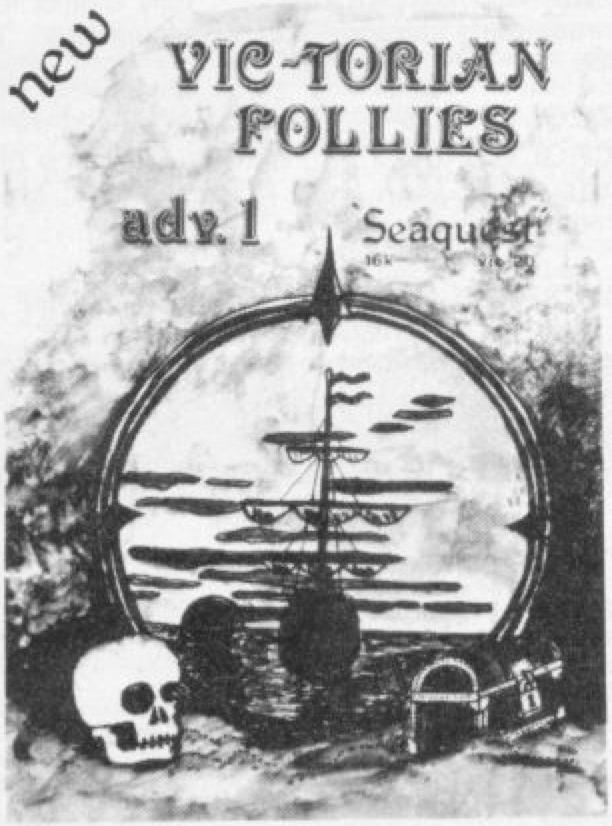
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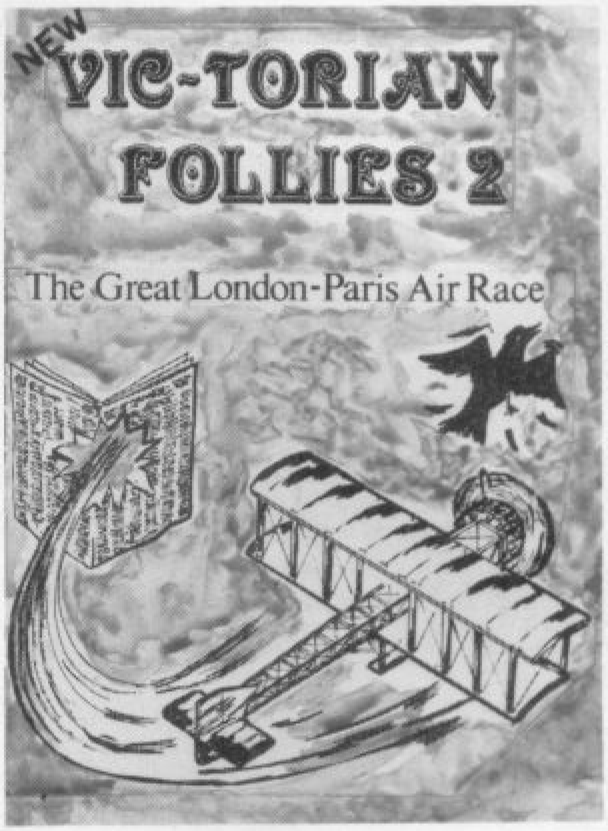
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Address

THE HOBBIT
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Price £14.95



This game was heralded as a milestone in adventure games software when it first appeared on the Spectrum; it certainly retains that accolade now that it's on the 64 (and about time too).

Following the story of the book (which is provided free) you take Bilbo to the dragon's lair, steal the gold and return hopefully unscathed to your hobbit-hole. In this respect the book becomes an essential tool, providing you with clues as to how Bilbo might escape – you might find it's fun to read too, if only because it lets you get to know the characters.

The graphics are a little short of brilliant, and on the 64 version innovations such as 'animaction' add an extra degree of uncertainty. (Animaction relates to the independent movement of the characters throughout the story and is quite normal to come across a dead Warg killed in some action in which you were not involved.)

A booklet is also provided to explain the 'Inglish' language used, and it has a dictionary of words that may be used. This alone was enough to rate the program highly.
The overall result is quite brilliant, certainly amusing and incurably addictive. I have to admit that so far I have only seen 23 of the 50 full-screen graphic interpretations and look forward to hearing from anyone who can tell me how to escape the dragon without getting singed ...

Presentation:	■■■■■
Skill level:	■■■
Interest:	■■■■■
Value for Money:	■■■■■

HUNGRY HORACE
Melbourne House
Commodore 64
Joystick or keyboard
Price £5.95

Hungry Horace is the first of three 'Horace' titles to be translated from the Sinclair Spectrum. It follows a Pacman-type idea (picking flowers rather than eating power pills) while steering clear



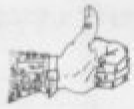
of the guards. As with the Spectrum version, there are four levels through which Horace progresses. But there's an added feature on the 64 – you can create your own mazes for Horace to negotiate.

It's nice to see that the program was upgraded for the 64; but in general the game offers little that's new. The program soon becomes repetitive because there's only four levels of play. It's still possible to create your own 'super' maze to improve on the ones offered but that's not much compensation for a generally poor game.

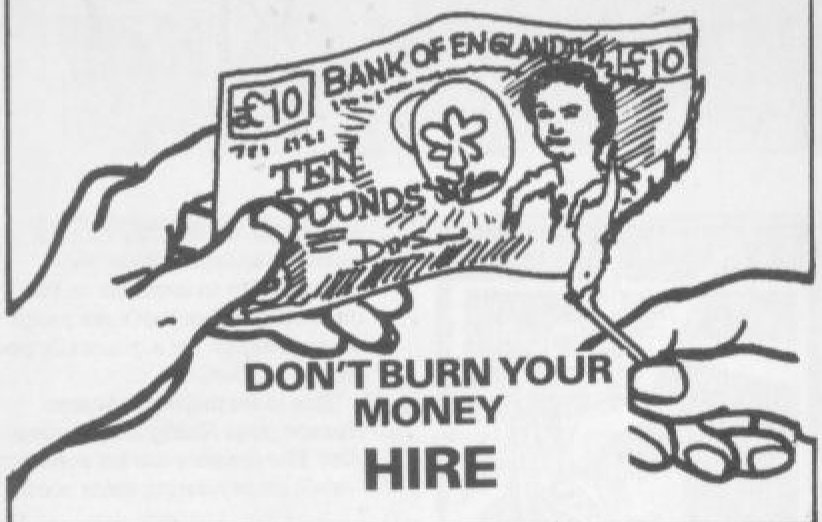
This is surprising, because *Horace goes Skiing* and *Horace And The Spiders* are far superior – we'll be reviewing them soon.

Presentation:	■
Skill level:	■■■
Interest:	■■
Value for Money:	■■■

LASERZONE
Llamasoft
+8K, Joystick only
Price: £6



Llamasoft goes from strength to strength – and this game could be the ultimate challenge. The joystick is used to control two spaceships, one horizontally along the bottom of the grid and the other vertically along the lefthand side. Wave after wave of the inevitable aliens drift in both directions and you have to destroy them by aligning one or both spaceships on grid intersections



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and firing. If aliens reach the edge of the grid they advance towards you bent on your destruction! To overcome the problem you can use diagonal fire to protect one spaceship – as a last resort you can blow one of the limited supply of Electros. Complex it is, but happily the game includes a training mode which enables you to master spaceship control. This is the most difficult game we have come across so far; but the superb graphics, sound and colour ensure that you are committed to return to this exhilarating arcade quality game frequently.

Llamasoft, 49 Mount Pleasant, Tadley, Hants.

Presentation: ■■■■■
Skill level: ■■■■■
Interest: ■■■■
Value for Money: ■■■■

MISSION MERCURY
Virgin Games
Unexpanded, Joystick only
Price £7.95

Your mission is to rescue the stranded scientists from the surface of the planet Mercury. After leaving the mother ship, you have to steer very carefully through an asteroid belt to land on one of the three pads. One of the scientists hops on board and you attempt to return to the mother ship which is bouncing overhead from one side of the screen to the other. The joystick fire button operates the release from the mother ship and also your rate of descent/ascent. The game is uncomplicated, but at least the graphics are crisp and smooth with interesting colour. Well presented for family entertainment.

Virgin Games, 61/63 Portobello Road, London W.11

Presentation: ■■■
Skill level: ■■
Interest: ■■■
Value for Money: ■■

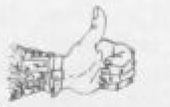
METEOR BLASTER
Terminal Software
Unexpanded, Joystick or Keyboard
Price: £5.95

This is a fairly ordinary Asteroids/ Invader game, though the movement of the spaceship is interesting. Moving the joystick (or using the relevant keys) leaves your ship fixed in the centre bottom of the TV screen; but approaching objects move, just as if you are looking out of a porthole. Your object is to avoid approaching meteors by steering away and/or blasting them with your laser. You lose shield energy every time you are hit until eventually you are destroyed. The presence of UFOs and tanker ships adds some interest to an otherwise fairly simple game. Graphics are just about adequate, but the sense of movement is poor as the star background is fixed; and the potential for interesting 3-D effects has not been exploited.

Terminal Software, 28 Church Lane, Prestwich, Manchester.

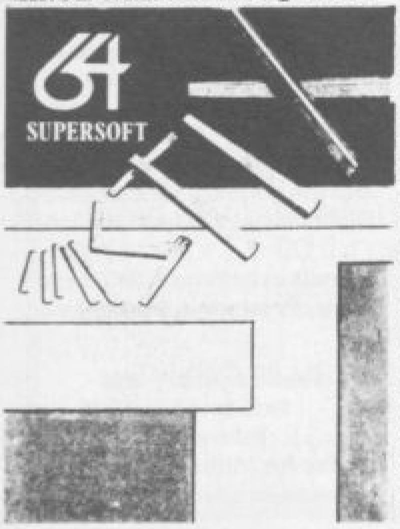
Presentation: ■■
Skill level: ■■■
Interest: ■■
Value for Money: ■■

STIX



Supersoft
Commodore 64
Joystick or keyboard
Price £8.95

"My turn now", "No, just give me another go", "Oh all right but only one" ... the **Commodore User** office hasn't been doing much work since Supersoft's new *Stix* game for the Commodore 64 arrived. What can be so good as to divert us all from our Great Pursuit and give us near-permanent paralysis of the joystick hand?



"Stix is a bundle of energy that roams the universe destroying all in its path," says the blurb. For the less imaginative, it's just a case of restricting the movement of this bundle of sticks which gyrates viciously and roams around the screen with unpredictable speed.

The cursor is located at the edge of the screen at the beginning of each game and you move it up, down or sideways to form blocks which the stix can't penetrate. When you've completed a block, it miraculously fills with colour. You carry on making blocks until you've filled 75 per cent or more of the screen. Then you start all over again, having collected 100 bonus points for percents above 75.

Sounds easy? If the Stix (they really look nasty as they roam around) touch a line you're drawing before you've completed a block, you lose one of the three lives and you carry on from the previous block you made. Then there's the two 'primitive particles' which roam the edges of the screen and the lines you've drawn. Bump into one of these characters and you also lose a life. Try getting away from one too. Don't dawdle either, because your energy is steadily creeping away at the top of the screen. It all gets quicker as you carry on.

Stix is an original yet superficially very simple game that is positively addictive. Its use of the 64's colour is brilliant. The blocks you make alternate between different colours and the screen colour changes for each level of play.

The game lets you play cautiously or boldly – either way the stix will get you in the end. You'll even start creating pretty and colourful patterns when you get more skilled.

We've not lost interest yet although we could do with a heavy-duty joystick – the fun is wearing it out. Unreservedly recommended.

Presentation: ■■■■
Skill level: ■■■■
Interest: ■■■■■
Value for Money: ■■■■■

SKRAMBLE

Terminal Software
Unexpanded, Joystick or Keyboard
Price: £7.95

Like many other variants of this game, you manoeuvre a plane over mountainous terrain while bombing or firing your laser at enemy defence installations such as missiles, helicopters, and fuel dumps. You are flying against the clock and if you survive long enough, you run out of fuel. Destroying fuel dumps does gain you some time, however. The game increases steadily in difficulty, and after a while the missiles start firing back at you. Eventually you enter caves, requiring some nifty manoeuvering to avoid aliens who are trying to ram your ship. The graphics and sound are very good: and all in all, this is a good example of the type of game. Closer êxamination reveals that it is identical to the version marketed by Rabbit Software ...

Terminal Software, 28 Church Lane, Prestwich, Manchester.

Presentation: ■■■
Skill level: ■■■
Interest: ■■■
Value for Money: ■■■

TRAXX

Llamasoft
+8K, Joystick only
Price: £6

Traxx is a painting game similar in concept to *Gridder*. But Llamasoft has used the expanded memory capability to introduce arcade-quality graphics, sound effects and colour. You are presented with a uniform grid and steer your spaceship to paint around the grid squares: if you backtrack, or fail to meet another painted line within three line segments, painted segments are erased. While you are doing this an alien wanders through the grid and you must avoid crashing into it. After clearing one frame the next one has an extra alien. The speed of the game and also the number of aliens can be pre-selected; but even at the bottom level, precision joystick control is required. A catchy little tune plays continuously while you paint, but be warned – you'll grow tired of it!

Llamasoft, 49 Mount Pleasant, Tadley, Hants.

Presentation: ■■■■■
Skill level: ■■■■
Interest: ■■■
Value for Money: ■■■

VULTURES

J Morrison Micros
Commodore 64
Joystick
Price £6.95

Another original game for people with a ridiculous sense of humour. A set of vultures hover above your head and descend one by one. You have to zap them before they carry you away. The vultures drop eggs too (they look like something rather muckier) which crush you if they fall on your head.

But that's the easy bit. Then eggs start hatching and three vultures flap around simultaneously ready to grab you and lift you up and away out of the top of the screen. Not much in the way of graphics but the wings flap nicely. The sound isn't too imaginative either – you might have expected a few crowing sounds.

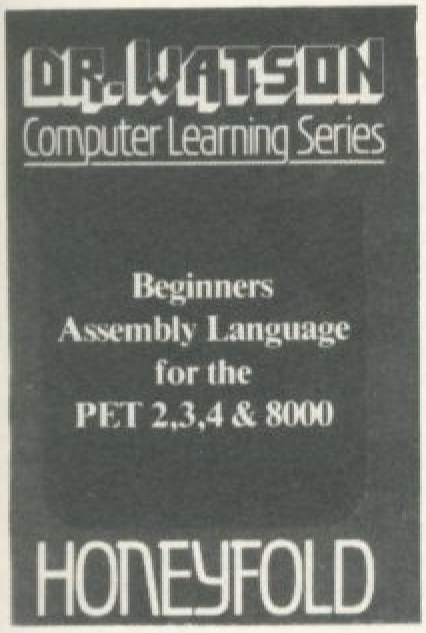
Presentation: ■■■
Skill level: ■■■
Interest: ■■■
Value for Money: ■■■■

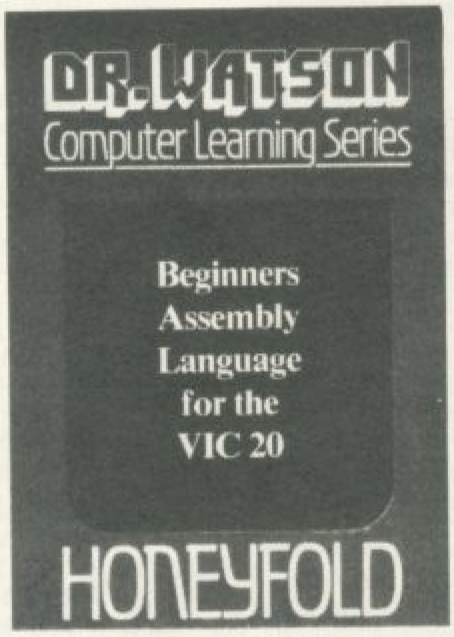
COMPLETE

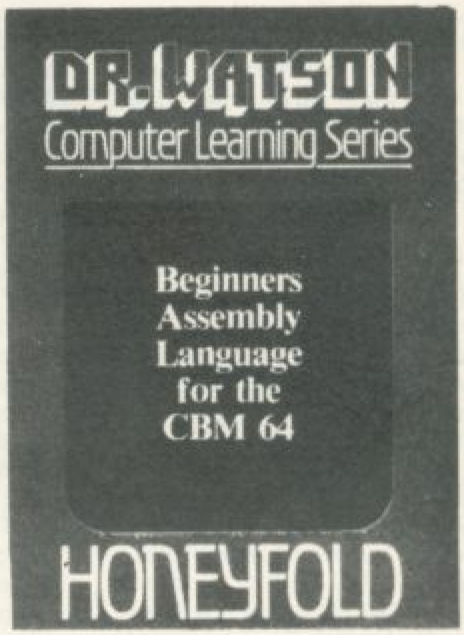
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Foolproof INPUTS

by Rick Myers and Mike Apsey

How many times have you been cautioned against use of comma or colon in response to an INPUT prompt, lest you see EXTRA IGNORED? How about the times you have typed in an alphabetic letter when a numeric variable was asked for only to get REDO FROM START?

These programming traps are an inconvenience at best; and they mess up an otherwise neat screen and confuse the poor beginner, spoiling the program run.

Most good Basic programs never afford the program operator an opportunity to make mistakes which cause ERROR message generation or program halts. Some of these 'error-traps' are difficult but possible to handle. Some even disable the RUN/STOP key (a practice which is becoming more common).

As for INPUTs, there are those who propose this Basic keyword never be used because of the associated problems; and they advocate a form of GET instead. Much has been written on this subject.

Some programs INPUT a string, and take the VALue of the string as the numeric variable, if a numeric is called for. INPUTs of this kind can be made to prevent the ?REDO FROM START error (which surprises most people who don't know how to respond to the prompt nor where to START FROM).

Here is a short routine to prevent all those ERRORs – yes, all of them! The most interesting feature of this subroutine is its ability to allow colon or comma to be taken by the variable. Here's how it works:

- POKE 198,5 lies to the keyboard buffer that it contains five things, as if those characters had been typed in. They won't be typed in; we will POKE them in. 198 won't know the difference.

  The next five characters will be poked directly into the keyboard buffer (631-640). Remember, the first one in is the first one out.
- POKE 631,5 will change the colour of the printing to white (same as the background, we presume so that the user won't be confused by all this foolishness, because:
- POKE 632,34 is going to print an invisible quote character to the screen, and:
- POKE 633,34 is going to print another one, getting us out of the "quote" mode, so we can move the cursor around, etc.
- Since we don't want the input to take both quotes, we: POKE 634,20, which is the delete key, thereby deleting the ending quote, but leaving the first.
- Finally, POKE 635,31 turns the cursor blue again, so the operator can see what is being typed.

From the Vic's point of view, it sees five characters in the buffer; turns the printing the same colour as the background; prints two quotes; deletes the trailing quote; and returns to blue to accept the input as if the operator had placed his response into quotes.

Within quotes, nearly anything is possible, so the input *can* contain colons and commas. The only thing it won't accept is quotes.

This little gem has several Basic possibilities. Company names can be entered with it even if ',Inc.' or ',Ltd.' is part of the name. Using a MID$ keyword, you could search the input for colon or comma and print your own error message (like NO COLON, PLEASE) and return to the input.

The same could be done with commas or any other character. You may also use this routine to check for alphabetics in a numeric response, and reject the letters, without causing the ?REDO FROM START business to mess up your nice screen.

The program is short, sweet, and a good tutorial.

```
10 REM INPUT ROUTINE
20 REM BY RICK MYERS AND MIKE APSEY
30 POKE 198,5: POKE 631,5: POKE 632,34: POKE 633,34:
   POKE 634,20: POKE 635,31
40 INPUT "DATE"; DS
50 PRINT DS: GOTO 20
```

Programming without PRINT USING
by Kenneth Parr

There is no PRINT USING or equivalent statement in the Vic Basic language. A command found in many versions of Basic, PRINT USING enables string numbers to be reformatted and is especially useful when displaying columns of figures in dollars and cents (or pounds and pence).

The following subroutine will perform the function of the missing PRINT USING statement. A short program to demonstrate its use precedes the subroutine.

This subroutine, placed once in a program, can reformat all variables used as dollar amounts. Let N be equal to the desired numeric variable before the GOSUB10 and PRINT N$ after the GOSUB10.

Numeric variables:

N– variable which links the inputed number of the main program with the subroutine.

D– acts as pointer to each character of E$

C– counter for determining when a comma should be displayed.

String Variables

E$– string representation of N.

N$– begins life as the last three characters of E$ (decimal point and the two digits right of decimal) and is manipulated one character at a time until a completely reformatted version of E$ has been created.

If you do not want the dollar sign to be printed, simply change line 100 to:

100 IFD$2THEN250

If you want any other currency sign, obviously you can put whatever you want inside the quotes in line 100.

Lines 250-260 are a small looping routine which will align the decimal points in a column of outputed figures up to $9,999,999.99 each.

There are 13 spaces in '£9,999,999.99'. When LEN(N$) – 13 (or is greater than 12, as is stated in the subroutine) on line 250, the looping routine terminates. Should you want a higher amount than £9,999,999.99 aligned in a column, use a number larger than 12. Use a number smaller than 12 when you want a lower amount.

This routine first appeared in the US mag Journal/20.

```
2   BS="    "
3   PRINT CHRS(147): FOR L=1TO7: PRINT CHRS (19): INPUT "INPUT IS";A: PRINT CHRS(145)BS
5   T=T+A: N=A: GOSUB 10: PRINT: PRINT: PRINT: PRINT TAB(5) "OUTPUT IS": FRO M=1TOL: PRINT: NEXT
7   PRINT NS: NEXT: PRINT "------------": N=T: GOSUB 10: PRINT NS: END
10  REM** PRINT USING Subroutine **
20  N=INT(N*100+.5)/100: ES=STRS(N): D=LEN(ES)
40  IF D-1<2 THEN 70
50  IF MIDS(ES,D-1,1)="." THEN D=D-2: ES=ES+"0": GOTO 90'
60  IF MIDS(ES,D-2,1)="." THEN D=D-3: GOTO 90
70  ES=ES+".00"
90  C=1: NS=RIGHTS(ES,3)
100 IF D<2 THEN NS="S"+NS: GOTO 250
150 IF C>3 THEN NS=","+NS: C=1
200 NS=MIDS(ES,D,1)+NS: C=C+1: D=D-1: GOTO 100
250 IF LEN(NS)>12 THEN 270
260 NS=" "+NS: GOTO 250
270 IF N<0 THEN NS=NS+"-"
280 RETURN
```

Icy Road *by S Karasen*

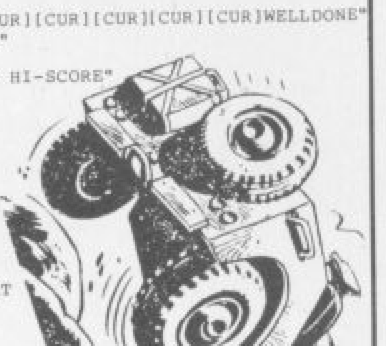
Driving in the snowy wastes of Mr K's Nordic homeland is probably like this all the time. It's a car-driving avoid-the-obstacles game, but a pretty good example of the genre: you're in a car (looks either like a Ralt Formula 2 racer or a Dinky toy, depending on your attitude) that's zipping along the icy road. Easy at first, with sweeping bends and not much more to negotiate; but it gets progressively more difficult, particularly when those morons start coming towards you without paying due attention to the road markings – probably drunk, too.

You're going to crash eventually, naturally. But the program tells you how far you got (by using the 'L' and '=' keys) before the inevitable happen.

The colours are a bit iffy, though – blue overall, with cars and road edges in white – and we think more could have been done with the graphics. It's a bit jerky too. With nearly 1300 bytes left on the unexpanded Vic, you could well add to this game yourself.




```
100 REM *** ICY ROAD ***
110 REM *** BY S KARASON, ICELAND ***
120 GOSUB770:POKE51,0:POKE52,29:POKE55,0:POKE56,29
130 POKE36879,110:B=7:U=7680+11+22*11
140 PRINT"[CLR][WHT]"
150 GOSUB530:GOSUB630:
160 POKE36874,128:POKE36878,10
170 G=100
180 A$="[WHT],.     .,"
190 FORI=1TO23:PRINTTAB(7)A$:NEXT
200 IFRND(1)>.1THENGOTO220
210 A=INT(3*RND(1)-1)
220 IFA+B<0THENA=0
230 IFA+B>14THENA=0:B=14
240 B=B+A:
250 POKEU,32
260 SYS(832):PRINT"[HOM]                    ":PRINT"[HOM]"TAB(B)A$
270 IFPEEK(U)<>32THEN370
280 D=PEEK(197):IFD=22THENF=-1:POKE36877,235:FH=5
290 IFD=21THENF=1:POKE36877,235:FH=5
300 FH=FH-1:IFFH=0THENPOKE36877,0
310 U=U-F:F=0
320 POKEU,42
330 DI=DI+1
340 IFDI>200THENA$=",.     .,"
350 IFRND(1)>.85ANDDI>100THENPOKE7680+B+INT(4*RND(1)+2),43
360 GOTO210
370 POKE36877,250:POKE36878,15
380 FORI=1TO200:POKE36877,250-I/40:NEXT
390 POKE36877,150
400 FORI=15TO0STEP-.5:POKE36878,I:POKEU,102:POKEU,160:POKEU,32
410 FORR=1TO50:NEXT:POKE36877,200:NEXT
420 POKE36869,240
430 FORI=36874TO36878:POKEI,0:NEXT
440 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR]WELLDONE"
450 PRINT"[CUD][CUR][CUR]YOU MAKED "DI/100" KM."
460 PRINT"[CUD][CUR][CUR]ANOTHER GAME (Y/N)"
470 IFDI>DHTHENDH=DI:PRINT"[CUD][CUR][CUR]A NEW HI-SCORE"
480 POKE198,0
490 GETA$:IFA$=""THEN490
500 IFA$="Y"THENDI=0:F=0:RESTORE:GOTO120
510 IFA$="N"THENEND
520 GOTO490
530 FORI=32*8TO32*8+8:POKEI+7168,0:NEXT
540 FORI=42*8TO42*8+8:READA:POKE7168+I,A:NEXT
550 FORI=44*8TO44*8+8:POKE7168+I,0:NEXT
560 FORI=43*8TO43*8+8:READA:POKE7168+I,A:NEXT
570 FORI=46*8TO46*8+7:READA:POKEI+7168,A:NEXT
580 FORI=48*8TO58*8:POKE7168+1,PEEK(32768+I):EXT
590 POKE36869,255:RETURN
600 DATA219,255,219,24,24,219,255,219,
610 DATA27,255,222,219,27,222,255,208
620 DATA0,0,16,0,0,16,0,0,0
630 CS=0:READLO:IFLO<>832THENSTOP
640 READCO:CS=CS+CO
650 IFCO=-1THEN680
660 POKELO,CO:LO=LO+1
670 GOTO640
680 READS:IFCS<>S+21THENPRINT"CHECKSUM ERROR":STOP
690 RETURN
700 DATA832
710 DATA169,228,133,252,169,31,133,253,160,0,177,252,170,24,165,252,105,22,144,2,230
720 DATA253,133,252,138,145,252,56,165,252,233,23,176,2,198,253,133,252,165,253,201,30
730 DATA208,222,165252,208,218,96
740 DATA-1,7983
750 DATA832
760 RETURN
770 PRINT"[CLR]":POKE36879,157
780 PRINT"[RED][CUD][CUD][CUR][CUR][CUR][CUR][CUR][RVS]ICY ROAD[RVO]"
790 PRINT"[CUD][CUR][CUR][CUR]BY S. KARASON"
800 PRINT"[CUD][CUR][CUR][CUR][RVS]L[RVO]-LEFT:[RVS];[RVO]-RIGHT"
810 PRINT"[CUD][CUR][CUR][CUR]** MISSION **"
820 PRINT"[CUD][CUR][CUR]TO DRIVE AS LONG"
830 PRINT"[CUD][CUR][CUR]AS YOU CAN BY "
840 PRINT"[CUD][CUR][CUR]AVOIDING THE CARS"
850 PRINT"[CUD][CUR][CUR]AND STAY ON THE ROAD"
860 PRINT"[CUR][CUR][CUR][CUR][CUR][CUR][RVS]READY ?"
870 GETA$:IFA$=""THEN870
880 IFA$="Y"THENRETURN
890 GOTO870
```



Machine Code *by J B Oakley*

This little machine-code Loader and Dump looks useful.

It is based on the one in *Vic Revealed* but as Mr Oakley points out, "unlike Nick Hampshire's routine it works". It also reverses the process so that memory can be dumped one 36-element page at a time. The locations are in decimal but their contents are in hex.

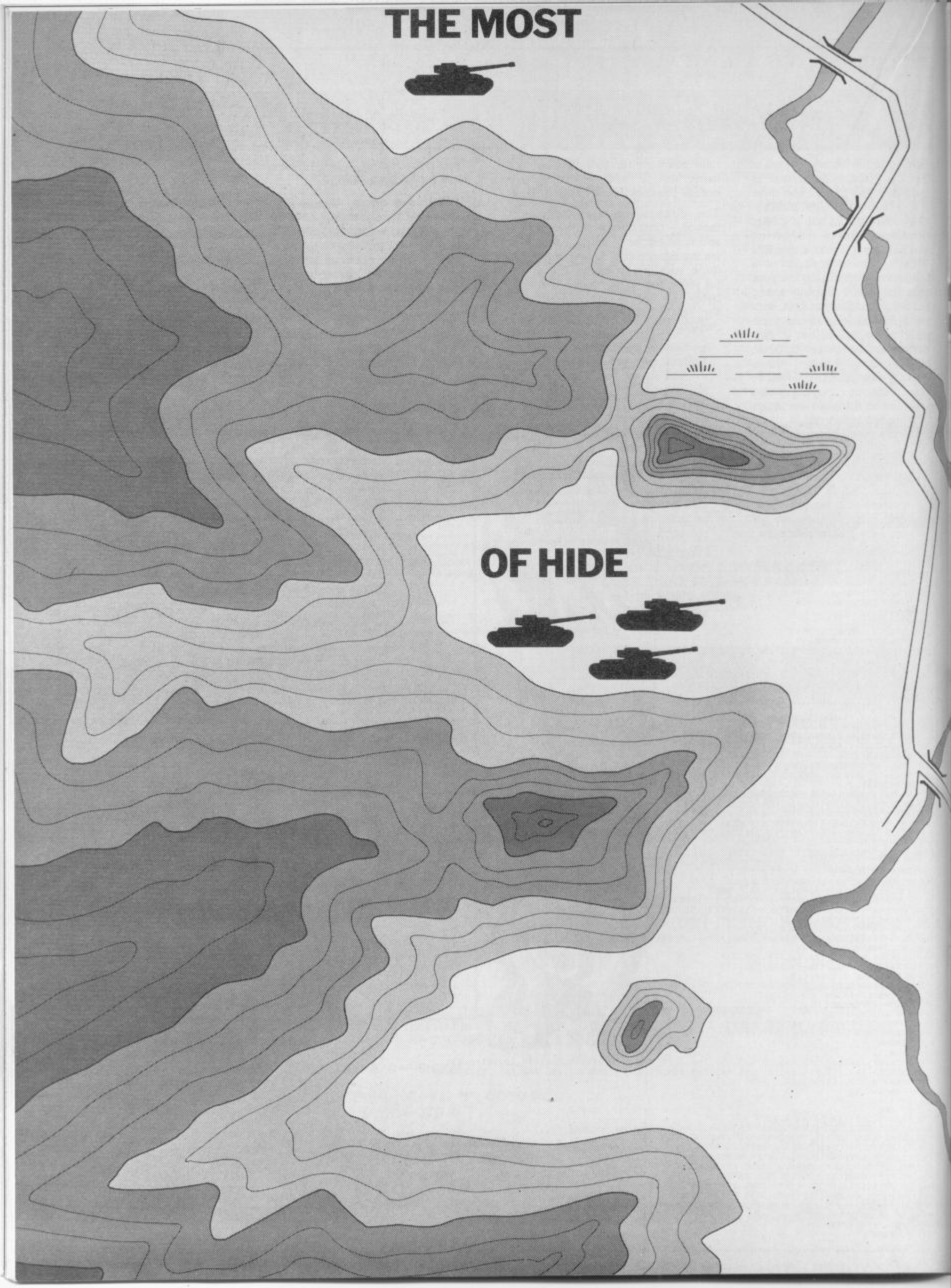
Mr Oakley makes no great claims for it as a piece of program writing: but he and we both consider it is neat, user friendly and looks quite good in colour "even though written on a monochrome set".

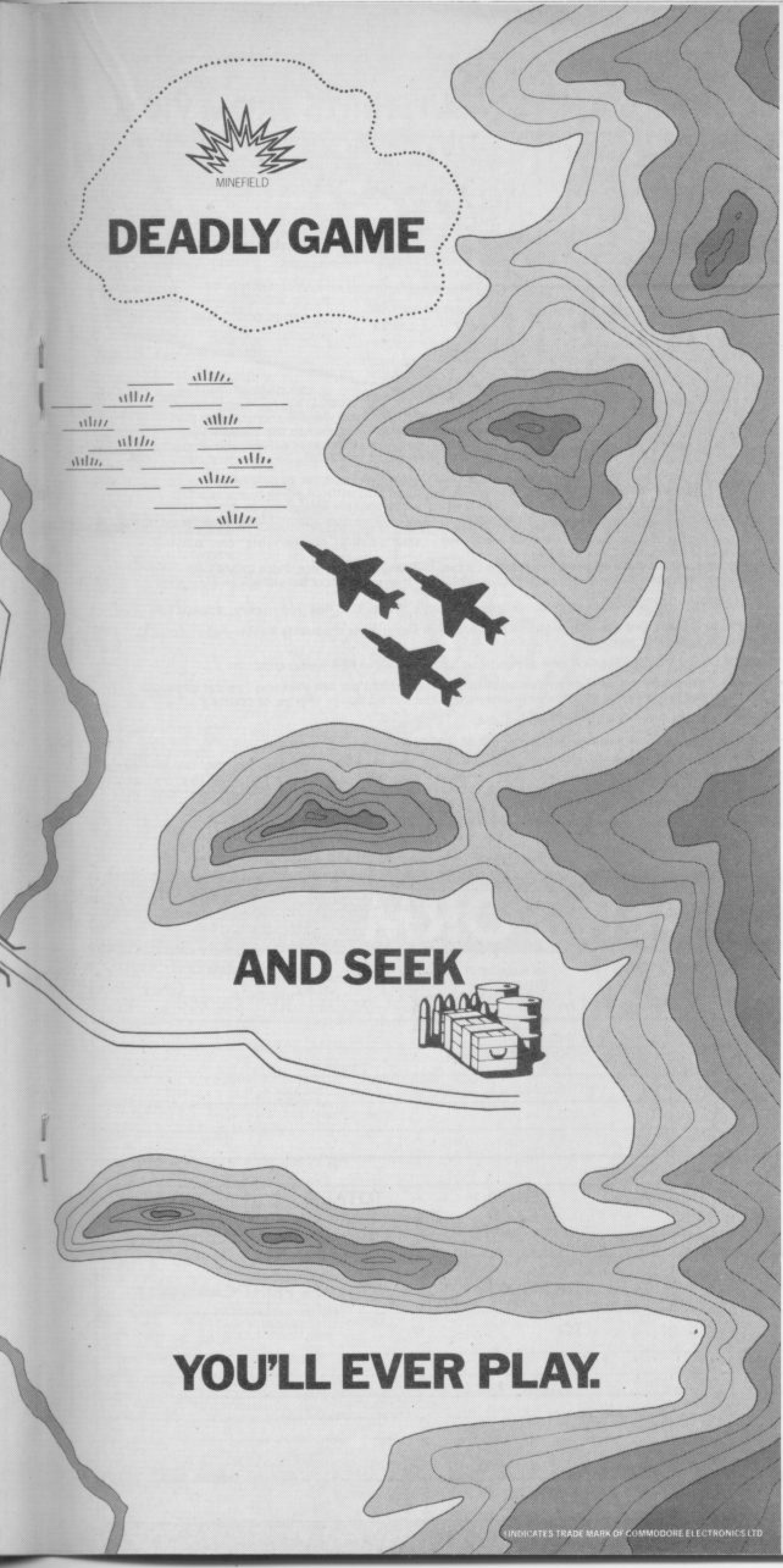
```
1 REM***NEXT LINE NUMBER IS 5000***
5000 REM**"HCXRETURNLDR/DMP"**COPYRIGHT-J.B.OAKLEY 1982**
5020 PRINT"[CLR]":V=36878:SL=V-4:SH=V-2:POKE36879,127
6000 PRINT"[CLR][CUD][CUR][GRN][RVS]MACHINE CODE LOADER[RVO]   [RVS]AND DUMP
      [RVO][CUD][CUD]"
6010 PRINT"[CUD][CUR][RED][RVS]OPTIONS[RVO]":PRINT"[CUD][CUD][CUR][RED][RVS]1[RV
O]  LOADER":PRINT"[CUD][CUD][CUR][RED][RVS]2[RVO]  DUMP"
6020 PRINT"[CUD][CUD][CUR][RED][RVS]3[RVO]  QUIT"
6030 PRINT"[CUD][CUD][CUD][CUD][CUD][CUR][RVS][BLU]TYPE OPTION NUMBER[RVO]"
6040 GETY$:IFY$=""THEN6040
6050 IFY$="1"THENGOSUB7000
6060 IFY$="2"THENGOSUB8000
6070 IFY$="3"THENGOSUB11000
6080 PRINT"[CLR]":GOTO6000
7000 PRINT"[CLR][CUD][RVS][CUR]\ACHINE -ODE LOADER"CHR$(14)"[CUD]"
7010 PRINT"[CUD][CUR]IOU ARE FIRST ASKED   FOR THE LOWEST MEMORY LOCATION."
7020 PRINT"[CUD][CUR]*LL MEMORY LOCATIONS  MUST BE CONSECUTIVE."
7031 PRINT"[CUD][CUR]IOU ARE THEN ASKED    FORTHE NUMBER OF       BYTES (LOCATION
S) YOU REQUIRE"
7040 PRINT"[CUD][CUR]OHEN PROMPTED, INPUT  A SINGLE BYTE AT A    TIME."
7050 PRINT"[CUD][CUD][RVS][CUR]PRESS BAR[RVO]"
7060 GETX$:IFX$=""THEN7060
7065 GOSUB9000
7070 PRINT"[CLR]NOTE-FIRST BYTE NUMBER IS ZERO [0]"
7080 FORT=0TON-1
7090 PRINT"[CUD][RED][RVS]INPUT BYTE[RVO][BLU]";T:INPUT"[CUD]";B$:C=LEN(B$):IFC=
1ORC=2THEN7120
7100 GOSUB10000
7110 GOTO7090
7120 L=ASC(LEFT$(B$,1))-48:R=ASC(RIGHT$(B$,1))-48
7130 IFR=>0ANDR<=22ANDL=>0ANDL<=22THEN7160
7140 GOSUB10000
7150 GOTO7090
7160 POKELC+T,MC
7170 FORS=1TO50:POKEV,7:POKESH,232:NEXT:POKEV,0:POKESH,0
7180 PRINT"[CLR]":NEXTT
7190 RETURN
8000 PRINT"[CLR][RVS][PUR][CUD][CUR][CUR][CUR]\ACHINE -ODE -UMP[RVO]"CHR$(14)
8005 PRINT"[CUD][CUD][CUR]IOU ARE ASKED FOR THE LOW MEMORY LOCATION
8010 PRINT"[CUR]FIRST AND THEN THE     TOTAL NUMBER OF THE    LOCATIONS."
8020 PRINT"[CUD][CUR]IHE OUTPUT WILL BE A  SCREEN PAGE AT A TIME AND TO OBTAIN
HE"
8030 PRINT"[CUR]NEXT PAGE YOU MUST     PRESS THE BAR."
8040 PRINT"[RVS][BLU][CUR][CUD][CUD]PRESS BAR TO CONTINUE[RVO]"
8050 GETX$:IFX$=""THEN8050
8060 GOSUB9000
8070 NT=0
8080 IFN>36THENNL=36
8090 IFN<=36THENNL=N
8100 PRINT"[CLR]"TAB(1)"[RVS]LOC"TAB(7)"HEX"TAB(12)"LOC"TAB(18)"HEX[RVO][CUD]"
8110 FORT=0TONL-1
8120 B=(PEEK(LC+T+NT))/16:L=INT(B):R=(B-L)*16:L=(L+48)-(L>9)*7:R=(R+48)-(R>9)*7
8130 HX$=CHR$(L)+CHR$(R):PRINTLC+T+NT" "HX$,
8140 NEXTT
8150 NT=NT+36
8160 N=N-NL:PRINT"[CUD][RVS][CUR]PRESS BAR[RVO]",
8170 IFN<=0THEN8200
8180 GETX$:IFX$=""THEN8180
8190 GOTO8080
8200 GETX$:IFX$=""THEN8200
8210 PRINT"[CLR]":RETURN
9000 PRINTCHR$(142)"[CLR][CUD][RVS]INPUT 1ST LOCATION[CUD][RVO]":INPUTLC
9010 PRINT"[CUD][RVS]INPUT TOTAL NUMBER OF LOCATIONS[CUD][RVO]":INPUTN
9020 RETURN
10000 PRINT"[CLR][RVS][PUR]BYTE[RVO]"T"[RVS]=[RVO]["B$"][RVS]????":PRINT"[CUD][R
VO]REDO BYTE[RVS]"T"[CUL][RVO]"
10010 FORS=1TO50:POKEV,7:POKESL,135:NEXT:POKEV,0:POKESL,0
10020 RETURN
11000 PRINT"[CLR]"CHR$(142):POKE36879,27
11010 END
12000 CLOSE4:OPEN4,4:CMD4:LIST
```

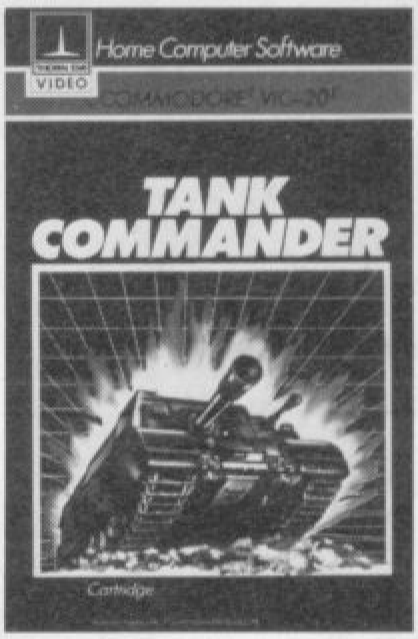


THE MOST

OF HIDE







Be warned, "Tank Commander" (on Commodore† VIC-20†), is for top scorers only.

As commander of a tank deep in enemy territory, your perilous mission is to seek out and destroy the enemy's fuel and ammunition dump.

That is, if you can manoeuvre through rivers, swamps and the odd minefield here and there.

By the way, there'll be an entire armoured tank division hunting you down.

If you're skilful enough to survive this lot, you must blow up the fuel dump.

If you're not, you'll get blown into a thousand pieces.

And if that doesn't make your hands sweat, try our other action-packed software.

Slot "Mutant Herd" into your computer and suddenly plutonium crazed mutants will try to eat you alive.

In "River Rescue" giant electric eels and killer crocodiles will be trying to have you for dinner while you navigate the wildest and most dangerous river in the world.

And if that doesn't give you heart failure try "4th Encounter," it's got 3 highly demanding skill levels.

Other anxiety provoking games are "Mine Madness," a terrifying ordeal in a goldmine.

And the best selling simulator game "Submarine Commander."

But the most difficult thing of all will be hiding them from your friends.

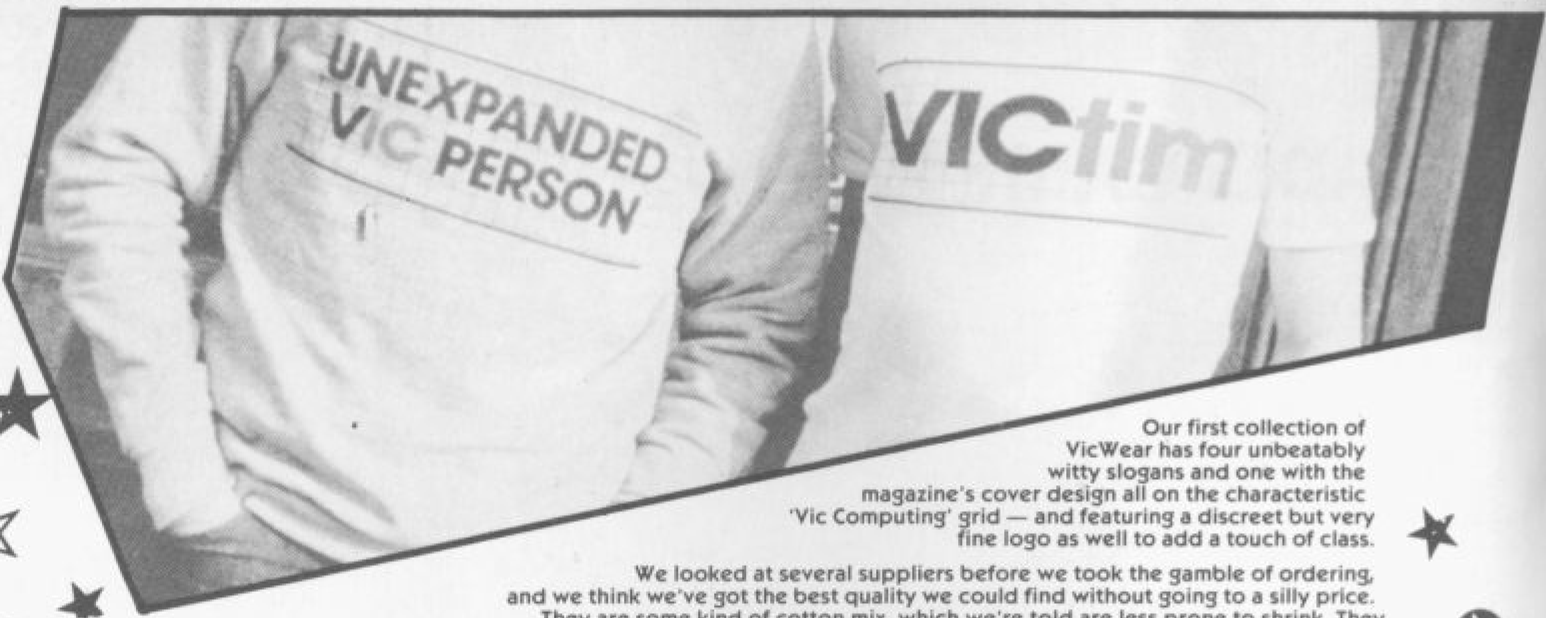
THORN EMI

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VicWear

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Vic Wear



Our first collection of VicWear has four unbeatably witty slogans and one with the magazine's cover design all on the characteristic 'Vic Computing' grid — and featuring a discreet but very fine logo as well to add a touch of class.

We looked at several suppliers before we took the gamble of ordering, and we think we've got the best quality we could find without going to a silly price. They are some kind of cotton mix, which we're told are less prone to shrink. They feel nicer, too.

- **Plain white tee-shirts** with printing in black and a bit of red: very smart, very comfortable for playing games, writing programs, and/or reading 'Vic Computing'. Price £3.00
- **Blue tee-shirts** with printing in black and red: we have to pay extra for the colour, but they do look nice. Price only £3.20
- **Grey tee-shirts** with printing in black and red: a bit thicker and again we have to pay more, so you do too. But still good value. Price £3.40
- **Grey sweatshirts** with printing in black and red: looks great. Excellent quality, warm but not too heavy. Price £7.00

Sizes: **small**(32-34), **medium** (34-36), **large** (38-40), and **extra large** (42-44 or more). The sweatshirts are pretty baggy — they actually make rather fine dresses on ladies of more diminutive stature.

Kids: We didn't get much demand for children's sizes the first time around. But 'small' seems to fit 8-9 year olds.

Overseas prices: Those prices above are for UK only. for **other European countries** add 30p per tee-shirt and 70p per sweatshirt. **For everywhere else in the world** add 95p per tee-shirt and £2.92 per sweatshirt. (It's the extra postage charge, of course.)

Extra charges: There aren't any, it's all included — VAT, post, packing, etc.

How to order: If you have an Access card, you can order by phone — call **01-241 2448.**

Otherwise fill in the form. Print a name and address on the despatch label (we cut that off and use it on the parcel), tot up the amount, and enclose a cheque or postal order with the order or give your Access number (for that we do need your signature — and make sure the address given is the one that Access has for you). Return the form to **VICWEAR, The Metropolitan, Enfield Road, London N1 5AZ**

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B. CAPTAIN KILOBYTE																
C. VICTIM																
D. POKE 36879																
E. UNEXPANDED VIC																

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Vicjack

by M Hinks

This Pontoon/Blackjack-type game was written by a 14-year-old and requires 16K expansion. You're given a generous £500 to gamble with at the beginning and along with the usual S for stick and T for twist – there's a double-your-bet key too.

Before you start playing, you've got an option to look at the (simple) rules. Then you wait a little while until the cards have been shuufled. Two cards appear; your's face up and the banker's face down, of course. Then you're asked to place your bet (a nice touch would have been to write it in French to give the Casino touch).

The game will accept any bet even if you haven't got the money to cover it – though of course *you* wouldn't play if you didn't have the cash, would you? So you can make a killing – or get a minus number, in which case "you're bust but thanks for playing". Well, at least you've not lost your shirt. One little departure from the normal way we play at Monte is that the banker shows his/her cards even if you're bust. Silly sod.

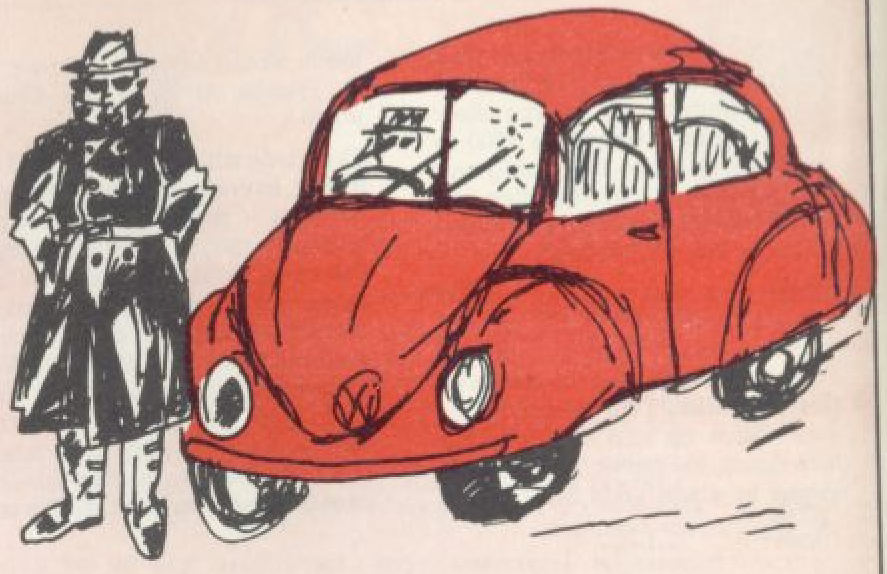




```
100 POKE 36879,[illegible]:PRINT"[CLR]"
110 PRINT"       **********"
120 PRINT"       *VICJACK*"
130 PRINT"       **********"
140 PRINT:PRINT
150 POKE 36878,15:POKE 36876,220
160 FOR L=1 TO 100:NEXT L
170 POKE 36876,0
180 FOR L=1 TO 500:NEXT L
190 POKE 36876,220
200 FOR L=1 TO 100:NEXT L
210 POKE 36876,0
220 FOR L=1 TO 500:NEXT L
230 POKE 36876,220
240 FOR L=1 TO 100:NEXT L
250 POKE 36876,0
260 PRINT"   PRESS 1 TO PLAY    "
270 PRINT"          OR          "
280 PRINT"  2 FOR INSTRUCTIONS  "
290 GET A$:IF A$=""THEN 290
300 IF A$="1"THEN 320
310 IF A$="2" THEN 1280
320 GOTO 1510
330 DIMC%(13):DIMA$(13):FORI=1TO13:READA$(I):NEXT
340 DATAA,2,3,4,5,6,7,8,9,10,J,Q,K
350 M=500:POKE36879,154
360 C$="[RED][RED][BLU][BLU]"
370 PRINT"[CLR]      [BLK]          ":PRINT"     [RED]CASH £"M
380 FORI=1TO13:C%(I)=4:NEXT
390 F=0:S=0:IFM<1THENPRINT"[CUD][CUD][RED]YOU'RE BUST BUT THANKSFOR PLAYING":GOT
O 1160
400 GOTO 430
410 END
420 IF B<0 THEN 420
430 FORI=1TO2:NC=I:NP=I
440 C=INT(RND(1)*13+1):IFC%(C)=0THEN440
450 CO%(I)=C:C%(C)=C%(C)-1:GOSUB750
460 C=INT(RND(1)*13+1):IFC%(C)=0THEN460
470 P%(I)=C:C%(C)=C%(C)-1:GOSUB820
480 IFI=1THENPRINT"[HOM][CUD][CUD][CUD][BLU]PLACE BET";:INPUTB:IF B=<0THEN370:IF
B>MTHEN370
490 NEXT:S=1:PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][
CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][PUR]STAKE"B
500 GOSUB1060:IFCV=21THENPRINT"[HOM][CUD][CUD][CUD][RED]I'VE GOT VICJACK":FORNC=
1TO2:GOSUB750:NEXT:GOTO880
510 IFPV=21THENPRINT"[HOM][CUD][CUD][CUD][PUR]VICJACK       ":GOTO880
520 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]
[CUD][CUD][CUD][CUD][CUD][CUD][CUD][PUR]STAKE"B
530 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]
      [CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CU
L][CUL][CUL][CUL][CUL][CUL][CUL][CUL]";
540 IFNP=5THENPRINT"[RED]A FIVE CARD TRICK":GOTO650
550 PRINT"[BLK]TWIST OR STICK?"
560 GETA$:IFA$=""THEN560
570 IFA$="S"THEN650
580 IFF=0ANDA$="D"THENB=B+B:F=1:GOTO520
590 IFA$<>"T"THEN560
600 C=INT(RND(1)*13+1):IFC%(C)=0THEN600
610 NP=NP+1:C%(C)=C%(C)-1:P%(NP)=C
620 GOSUB820:GOSUB1060
630 IFPV<=21THEN530
640 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]BUST
 "
650 FORNC=1TO2:GOSUB750:NEXT:NC=2
660 GOSUB1060:IFPV>21THEN880
670 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]
      [CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CU
L][CUL][CUL][CUL][CUL][CUL][CUL][CUL]";
680 IFCV>21THENPRINT"[BLU]I'M BUST":GOTO880
690 IFNC=5THENPRINT"[BLU]A FIVE CARD TRICK":GOTO880
700 IFCV=>PVTHENPRINT"[BLK]STICK":GOTO880
710 PRINT"[BLK]TWIST"
720 C=INT(RND(1)*13+1):IFC%(C)=0THEN720
730 NC=NC+1:CO%(NC)=C:GOSUB750
740 FORI=1TO2000:NEXT:GOTO660
750 PRINT"[HOM][CUD][CUD][CUD][CUD]":PRINTTAB((NC-1)*4);"[BLK] ⌐¬[CUD][CUL][CUL
][CUL][CUL]|[BLU]▒▒[BLK]|[CUD][CUL][CUL][CUL][CUL]|[BLU]▒▒[BLK]|";
760 PRINT"[CUD][CUL][CUL][CUL][CUL]|[BLU]▒▒[BLK]|[CUD][CUL][CUL][CUL][CUL] \_/[C
UL][CUL][CUL][CUP][CUP][CUP]";
770 FORJ=1TO500:NEXT:IFS=0THENRETURN
780 PRINT"  [CUD][CUL][CUL]";
790 PRINTMID$(C$,NC,1);A$(CO%(NC));:IFCO%(NC)<>10THENPRINT" ";
800 PRINT"[CUD][CUL][CUL]  "
810 RETURN
820 PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]":PRI
NTTAB((NP-1)*4);"[BLK] ⌐¬[CUD][CUL][CUL][CUL][CUL]|[BLU]▒▒[BLK]|[CUD][CUL][CUL]
[CUL][CUL]|[BLU]▒▒[BLK]|";
830 PRINT"[CUD][CUL][CUL][CUL][CUL]|[BLU]▒▒[BLK]|[CUD][CUL][CUL][CUL][CUL] \_/[C
UL][CUL][CUL][CUP][CUP][CUP]";
840 FORJ=1TO500:NEXT:PRINT"  [CUD][CUL][CUL]";
850 PRINTMID$(C$,NP,1);A$(P%(NP));:IFP%(NP)<>10THENPRINT" ";
860 PRINT"[CUD][CUL][CUL]  "
870 RETURN
880 FORI=1TO1000:NEXT
890 GOSUB1060:PRINT"[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]
              [CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CU
L][CUL][CUL][CUL][CUL][CUL][CUL][CUL][CUL]";
900 IFPV>21THENPRINT"[RED][CUD]YOU LOSE":GOTO980
910 IFCV>21THENPRINT"[RED][CUD]I LOSE":GOTO1000
920 IFCV=21ANDNC=2THENPRINT"[RED]I WIN":GOTO980
930 IFPV=21ANDNP=2THENPRINT"[RED][CUD]YOU WIN":GOTO1000
940 IFNP<5ANDC<5THENPRINT"[RED][CUD]I WIN":GOTO980
950 IFNC=5THENPRINT"[RED][CUD]I WIN":GOTO980
960 IFCV>=PVTHENPRINT"[RED][CUD]I WIN":GOTO980
970 PRINT"[RED][CUD]YOU'VE WON":GOTO1000
980 M=M-B:PRINT"[CUP][BLK][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]YOU HAVE
LOST £"B:GOTO 1670
990 GOTO1010
1000 M=M+B:PRINT"[CUP][BLK][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]YOU'VE W
ON £"B"  ":GOTO 1240
1010 PRINT"PLAYING AGAIN ?"
1020 GETA$:IFA$=""THEN1020
1030 IFA$="Y"THENPRINT"[CLR]":GOTO370
1040 IFA$<>"N"THEN1020
1050 END
1060 FORI=1TONP:A%(I)=P%(I):NEXT:LI=NP:GOSUB1090
1070 PV=V:FORI=1TONC:A%(I)=CO%(I):NEXT:LI=NC
1080 GOSUB1090:CV=V:RETURN
1090 V=0:FORI=1TOLI
1100 VC=A%(I):IFVC>10THENVC=10
1110 IFVC=1THENVC=11
1120 V=V+VC:NEXT:IFV<=21THENRETURN
1130 V=0:FORI=1TOLI
1140 VC=A%(I):IFVC>10THENVC=10
1150 V=V+VC:NEXT:RETURN
1160 POKE 36874,224:POKE 36878,15
1170 FOR M=1 TO 250:NEXT M
1180 POKE 36878,0
1190 FOR A=1 TO 75:NEXT A
1200 POKE 36874,200:POKE 36878,15
1210 FOR N=1 TO 750:NEXT N
1220 POKE 36878,0:POKE 36874,0
1230 GOTO410
1240 POKE 36876,240:POKE 36878,15
1250 FOR A=1 TO 750:NEXT A
1260 POKE 36878,0
1270 GOTO 1010
1280 POKE 36879,26
1290 PRINT"[CLR][CUD]      **********"
1300 PRINT"      *VICJACK*"
1310 PRINT"      **********"
1320 PRINT
1330 PRINT"A BLACKJACK/PONTOON"
1340 PRINT"TYPE GAME.YOU ARE"
1350 PRINT"GIVEN £500 TO START"
1360 PRINT"WITH AND SHOWN ONE OF"
1370 PRINT"YOUR CARDS.YOU ARE"
1380 PRINT"THEN ASKED TO PLACE"
1390 PRINT"YOUR BET."
1400 PRINT"  YOU CAN TWIST BY"
1410 PRINT"PRESSING 'T'."
1420 PRINT"  YOU CAN STICK BY"
1430 PRINT"PRESSING 'S'."
1440 PRINT"AND YOU CAN EVEN"
1450 PRINT"DOUBLE YOUR BET BY"
1460 PRINT"PRESSING 'D'."
1470 PRINT
1480 PRINT"PRESS 1 TO PLAY"
1490 GET A$:IF A$=""THEN 1490
1500 IF A$="1"THEN 1510
1510 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR][CUR][CUR][CUR
][CUR]I'M"
1520 PRINT"[CUD][CUD][CUD][CUD][CUD][CUR][CUR]SHUFFLING THE CARDS"
1530 PRINT"[CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR]PLEASE WAIT"
1540 POKE 36875,135:POKE 36878,15
1550 POKE 36875,0:POKE 36878,0
1560 LET G=G+1:IF G<20 GOTO 1540
1570 FOR G=1 TO 500:NEXT G
1580 POKE 36875,135:POKE 36878,15
1590 POKE 36875,0:POKE 36878,0
1600 POKE 36878,0
1610 LET V=V+1:IF V<20 GOTO 1580
1620 FOR H=1 TO 500:NEXT H
1630 POKE 36875,135:POKE 36878,15
1640 POKE 36875,0:POKE 36878,0
1650 LET K=K+1:IF K<20 GOTO 1630
1660 GOTO 330
1670 POKE 36874,0:POKE 36875,0
1680 POKE 36876,135:POKE 36877,0
1690 POKE 36878,15
1700 FOR T=1 TO 750:NEXT T
1710 POKE 36876,0:POKE 36878,0
1720 GOTO 990
```

Resistance Escape

by D Hearn



This is a game for the unexpanded Vic and joystick. You are a member of the Resistance trying to work your way through a maze of streets to a pick-up alley before the Gestapo grabs you and carries you off.

The game begins with a maze of houses (they look rather like those semis on the outskirts of Worthing) and a Gestapo car, two-tone siren blaring which rushes across and stops. A nasty jumps out and immediately homes in on you as you move away from your starting position at the top of the screen. Using a joystick, you weave your way down through the streets to safety – the white house at the bottom opposite corner.

If the Gestapo grabs you before you get there, you're machine-gunned and lifted away to Heaven at the top of the screen with added halo. But more horrors are in store if you reach home. Another car comes blaring along and then there are two agents chasing you. When you've scored 30 points (we didn't get that far), a wall appears down the centre of the screen.

Mr Hearn tells us that there were only 19 bytes left when he'd finished the program, which sounds like pretty good use of an unexpanded Vic. The graphics look nice too.

```
100 REM *** RESISTANCE ESCAPE ***
110 REM *** BY DAVE HEARN ***
120 PRINT"[CLR]"
130 POKE36879,10
140 PRINT"[WHT]"
150 PRINT"[CUD][CUD][CUD][CUD]   [RVS]RESISTANCE ESCAPE"
160 PRINT"[CUD][CUD]     BY DAVE HEARN"
170 PRINT"[CUD][CUD][CUD]      PLEASE WAIT"
180 POKE51,255:POKE52,27:POKE55,255:POKE56,27
190 FORI=0TO511
200 POKE7168+I,PEEK(32768+I):NEXT
210 FORI=0TO(9*8-1):READA
220 POKE7168+I+(33*8),A:NEXT
230 DATA0,206,223,255,255,255,255,255
240 DATA255,153,153,255,231,231,231,0
250 DATA28,44,28,255,1,62,54,119
260 DATA56,22,56,255,128,124,24,60
270 DATA60,126,36,255,189,189,60,108
280 DATA60,126,36,255,60,60,24,56
290 DATA127,68,68,68,127,167,255,56
300 DATA192,64,64,124,254,94,255,28
310 DATA119,7,119,112,119,7,119,112
320 DATA999
330 POKE36869,255
340 PRINT"[CLR][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR]USE JOYSTIX
350 PRINT"[CUD][CUD][CUD]  NOW LOAD PART TWO  "
360 PRINT"[CUD][CUD]'(  '(  '(  '(  '(  '("
```

```
100 REM *** RESISTANCE ESCAPE PART TWO ***
110 SC=000:LF=5
120 PRINT"[CLR]":POKE36879,12
130 PRINT"[HOM][YEL]SCORE "SC    "[CUR][RED]LIVES"LF
140 POKE36878,15
150 S=7680:B=44:A=0:D=0:C=S+30720:GE=37:SD=7702:SA=1:CH=35:Y=0:CD=38423
160 DF=1:DG=-1:JJ=0:SB=8142:V1=36874:V2=36877
170 SG=8098:GS=14:SH=7768:GH=14:H=0
180 POKE36878,15
190 POKES+B+A,33
200 POKEC+B+A,2
210 A=A+1
220 IFA=22THEN240
230 GOTO190
240 B=B+22:A=0
250 POKES+B+A,34
260 POKEC+B+A,5
270 A=A+1
280 IFA=22THEN300
290 GOTO250
300 B=B+44:A=0
310 IFB>462THEN330
320 GOTO190
330 B=44:BB=66:A=0
340 POKES+B+A,32
350 POKES+BB+A,32
360 A=INT(RND(1)*22)+0
370 AA=AA+1
380 IFAA=9THEN400
390 GOTO340
400 AA=0:BB=BB+66:B=B+66
410 IFB>462THEN430
420 GOTO340
430 POKESD+SA,CH:POKE7723,34:POKE8164,34:POKE7702,34:POKE8185,34
440 FORT=1TO500:NEXT
450 POKE7725,32:POKE7747,32:POKE7744,32:POKE7766,32
460 IFSC>25THENGOTO1040
470 CA=8098:CC=CA+30720:GOSUB750
480 PRINT"[HOM][YEL]SCORE "SC    "[CUR][RED]LIVES"LF
490 POKE37151,0:PA=37151:PB=37152:RB=37154
500 A=PEEK(PA):POKERB,127:B=PEEK(PB):POKERB,255
510 IF(AAND4)=0THEN590
520 IF(AAND8)=0THEN610
530 IF(BAND128)=0THEN630
540 IF(AAND16)=0THEN650
550 GOTO580
560 CD=SD+30720:IFCH=35THENCH=36:GOTO580
570 CH=35
580 POKESA+SD,CH:POKECD+SA,4:GOTO670
590 POKESA+SD,32:IFSD>7702ANDPEEK(SA+SD-22)=32THENS=SD-22:GOTO560
600 GOTO570
610 POKESA+SD,32:IFSD<8164ANDPEEK(SA+SD+22)=32THENSD=SD+22:GOTO560
620 GOTO570
630 POKESA+SD,32:IFPEEK(SA+SD+1)=32ANDSA<21THENSA=SA+1:GOTO560
640 GOTO570
650 POKESA+SD,32:IFSA>0ANDPEEK(SA+SD-1)=32THENSA=SA-1:GOTO560
660 GOTO570
670 SF=SG:FS=GS:X=1:GOSUB900
680 IFY=1THENSF=SH:FS=GH:X=2:GOSUB900
690 IFSD+SA=7722ANDH=1THENSC=SC+10:GOTO1290
700 IFSA+SD=8184THENX=1:SA=1:SD=8164:POKE8184,32:SC=SC+5:H=1
710 IFX=1THENCA=7768:Y=1:CC=CA+30720:GOSUB750
720 IFGE=37THENGE=38:GOTO740
730 GE=37
740 GOTO480
750 POKECA+CB,32:POKEV1,0
760 IFSI=230THENSI=240:GOTO780
770 SI=230
780 CB=CB+1
790 POKECC+CB,2:POKECC+CB+1,2:POKEV1,SI:POKECA+CB,39:POKECA+CB+1,40
800 FORT=1TO150:NEXT
810 IFCB=15THEN840
820 IFCB=20THEN860
830 GOTO750
840 FORT=1TO220:NEXT:POKEV1,0:POKECA+CB-1,GE:FORT=1TO200:NEXT
850 GOTO750
860 POKECA+CB,32:POKECA+CB+1,39:FORT=1TO50:NEXT
870 POKECA+CB+1,32
880 X=0:CB=0:POKEV1,0
890 RETURN
900 POKEV1,128
910 POKESF+FS,32
920 IFSF<SDANDPEEK(SF+FS+22)=32ORPEEK(SF+FS+22)=CHTHENSF=SF+22:GOT980
930 IFSF>SDANDPEEK(SF+FS-22)=32ORPEEK(SF+FS-22)=CHTHENSF=SF-22:GOTO980
940 IFFS>SAANDPEEK(SF+FS-1)=32ORPEEK(SF+FS-1)=CHTHENFS=FS-1:GOTO980
950 IFFS>SAANDPEEK(SF+FS-1)=41THENFS=FS-2:GOTO980
960 IFFS<SAANDPEEK(SF+FS+1)=32ORPEEK(SF+FS+1)=CHTHENFS=FS+1
970 IFFS<SAANDPEEK(SF+FS+1)=41THENFS=FS+2
980 IFX=1THENSG=SF:GS=FS:X=0
990 IFX=2THENSH=SF:GH=FS:X=0
1000 FC=SF+FS+30720
1010 POKEFC,2:POKESF+FS,GE
1020 POKEV1,0:IFSA+SD=SF+FSTHEN1080
1030 RETURN
1040 POKE7713+AZ,41:POKE38433+AZ,2
1050 AZ=AZ+22
1060 IFAZ=60THENAZ=0:GOTO470
1070 GOTO1040
1080 POKESA+SD,42
1090 POKEV2,185:FORT=1TO10:NEXT
1100 POKEV2,0:FORT=1TO50:NEXT
1110 MG=MG+1
1120 IFMG=15THENMG=0:GOTO1140
1130 GOTO1090
1140 POKESA+CD-22,1:POKESA+SD,CH:POKESA+SD-22,15:POKESA+SD+22,32
1150 FORT=1TO150:NEXT
1160 SA=SA-22
1170 IFSA+SD<7680THEN1190
1180 GOTO1140
1190 LF=LF-1:IFLF=0THEN1210
1200 GOTO120
1210 IFSC>HITHENHI=SC
1220 PRINT"[CLR][WHT][CUD][CUD][CUD][CUD][CUR][CUR]   [CUR]SCORE "SC
1230 PRINT"[CYN][CUD][CUD][CUD][CUD][CUD][CUR][CUR]HI SCORE  "HI
1240 PRINT"[CUD][CUD][CUD][CUR][CUR][CUR][RED]AGAIN? Y/N
1250 GETA$:IFA$=""THEN1250
1260 IFA$="N"THENPOKE36879,27:PRINT"[CLR]"
1270 IFA$="Y"THENGOTO110
1280 IFA$<>"Y"THEN1250
1290 POKEV1,230
1300 FORT=1TO200:NEXT
1310 POKEV1,0
1320 MU=MU+1
1330 IFMU=3THEN1350
1340 GOTO1290
1350 POKEV1,225:MU=0:FORT=1TO800:NEXT:POKEV1,0
1360 GOTO120
```



Word processing Round-up

Simply Write

by Chris Durham

Once upon a time word processors were strictly business-oriented, usually costing some thousands of pounds. With the advent of cheaper microcomputers, however, low-cost word processing was feasible: and even WP at home quickly became a reality.

Computers with proper typewriter keyboards like that of the Vic and the CBM 64 have encouraged a proliferation of such programs with prices dropping rapidly amid fierce competition. So how does one choose between the various WP programs on offer when only a few pounds separate some of the rivals?

Chris Durham has been looking at word processor packages for the 64 and over the next few months will be giving you a run down on each of the main contenders. This month: the explicitly entitled Simply Write for the 64.

Much has been written about the advantages of word processing including the February 1983 issue of **Vic Computing:** so I won't go into great detail here. Suffice to say that a good WP program will allow you to type in a letter or document, correct it, format it and finally print it – all with a minimum of fuss.

Having said that, the way in which these apparently straightforward procedures are implemented vary widely between programs; the trick is to find a WP program that achieves these aims in a manner most convenient to you, the user.

Rule two: most WP programs can do far more than the basic text processing and output that I have outlined above. The thing to remember, though, is that no matter how many extra facilities a word processing program may have, if it can't achieve the basic aims easily and conveniently then it's really not worthwhile . . .

The CBM 64 is almost the ideal machine for WP at home. It has a superb keyboard with a good 'feel', it has colour to allow improved legibility, it has a good full-screen editor, it has a range of function keys and other 'control' keys which are ideal for selecting facilities with a single key press. To be really worth consideration, then, any potential WP purchase should make full use of all these facilities otherwise they are wasted. As you will discover, some of the programs under review failed to exploit the 64 to the full in at least one of these areas.

On the other hand, the one thing that prevents the 64 from being completely ideal for WP is the 40-column screen; most commercial word processors and WP packages operate over 80 columns, which, after all, more nearly fits the width to the text you're likely to type.

Most programs for 40-column screens get round this problem in one of two ways. They either re-format the text into the required number of columns when printing: or they 'scroll' the text sideways on the screen to allow 80 (or more) columns to be typed in directly.

Whether you prefer the 'format on printing' or 'format as you type' approach, the latter normally allows you to achieve a correct layout more quickly; some people however dislike the 'jumping' effect in the document on the screen which this inevitably entails.

Just in case some of you think these reviews and those in subsequent issues are a little harsh in places, let me make two points. First, this is a very competitive area of the software market: and a program must be good if it hopes to get a share in it. Why should the user pay for anything less than the best when there is so much choice?

WP programs

The programs we have under review comprise the majority of the currently-available word processors for the 64 and include all the popular packages such as WORDCRAFT and WORDPRO 3: if other programs are received from the suppliers in time we will include them too. Meanwhile, this is what you can expect.

- **Simply Write for the 64** is the logical follow-on from the Pet and Vic-20 versions from Simple Software of Brighton. The program is available on tape or disk: the review copy was on disk.
- **Quick Brown Fox** is another follow-on from a Vic-20 version; in the UK it is marketed by SPT Electronics, although it originates from an American company. This is a cartridge-based program, with example letters and the like supplied on a disk.
- **Wordcraft 40** from Audiogenic follows a distinguished line of word processing programs of the same name – a best-seller on the Pet, also sold for 16-bit micros now. Like the Vic-20 version reviewed a year ago, it is ROM-based in the form of a plug-in cartridge.
- **Paperclip** is an adaptation of another successful Pet program written by the quaintly named US company Batteries Included (sic) and marketed in the UK by Kobra. This is a disk-based program with a security 'key' or 'dongle' which has to be fitted into one of the control ports.
- **Vizawrite 64** is a new WP program written specially for the 64 by Vizasoft, which hails from Kent. It is currently available on both disk and cartridge; the disk version has been reviewed.
- **Script 64** is another new package, this time from Impex Software (replacing the Impex *Word-Pac* program). It comes on disk with a security key; included is a Dictionary and Spelling Checker within the price.'
- **WordPro 3 Plus/64** is the latest offering from Professional Software Inc. and is distributed by Wego Computers Ltd in Caterham. It follows a long line of similar packages for Commodore machines, and WordPro too is a best-seller on the Pet.
- **Easyscript** is the official Commodore offering, currently available only on disk. A cartridge version will be appearing later this year and will support filing on to cassette.
- **Memo Pad** is not so much a word processor as a modest little text editor on cassette. At a mere £3.99 however, it certainly deserves a look. This comes from Bubble Bus of Tonbridge.



More WINNING GAMES from LYVERSOFT

LUNAR RESCUE (48K SPECTRUM)
A team of research scientists are trapped on the moon and you have to pilot the rescue pod from the mother ship and ferry them back safely. But you have only space for one scientist at a time. 100% M/C action with super smooth HI-RES GRAPHICS AND JOYSTICK OPTION.

LIBERATOR (16K/48K SPECTRUM)
This game tests your aim and reactions as you command a gunsight on a homeward bound space freighter. Your cargo is the royal treasures of the empire and many people want them.
A machine code presentation that should have you hooked.

THUNDERHAWK (48K SPECTRUM)
Based on the popular arcade game Pheonix. This 100% full colour epic pitches you against the evil Albertrons who are set to destroy your race, five levels of fast action bring you to the command centre of battle fleet, can you finish the job. WITH JOYSTICK OPTION.

GOLF (48K SPECTRUM)
Using M/C graphic routines, a game to absorb the keen novice and the scratch player. Play on a 9 or 18 hole course, with full selection of clubs. Along the greens and fairways hours of addictive sport can be had.

PICTURE PUZZLE (DRAGON 32)
With HI RES graphics and 100% M/C. You are set the problem of putting the picture back together. Test your skill against the dragon 32 computer. A game guaranteed to hold you spell bound for hours.

ANDROID INVADERS (DRAGON 32)
In a change of tactics the beings beyond the stars have developed an android of human form to do their dirty work. And with the aid of sensor jamming they may prove formidable. Using full colour, M/C, hi-re graphics this game can offer up to 21 levels of combat.

VOYAGER (VIC 20 8 OR 16K)
The mission is simple, but its completion is far from being so. As captain of starship you have all the best facilities at your disposal. Unfortunately the klingons oppose you. A great M/C version of this classic computer game.

SPHINX (VIC 20 8 OR 16K)
A riveting, full colour graphic adventure. That pits you against the spells and guardians of the tomb. In your quest to uncover the treasure of the pharoahs. This game will have you enthralled.

BIRD OF PREY (BASIC VIC 20)
Evil baron von fritz is out to kill his cousin, the much loved Prince Rupert. The Baron intends to throw the prince from his plane into the sacred fire pit. But you the eagle of the north will make every endeavour to save your friend Prince Rupert. With colour, sound, this M/C game is a must.

ALSO AVAILABLE:
Demon Driver Basic VIC20 — £5.95
Lunar Rescue Basic VIC20 — £5.95
Space Assault 3 or 8 VIC20 — £5.95
Apple Bug/Crazy Climber Basic VIC 20 — £5.95
Nuclear Attack/Grand Prix Basic VIC20 — £5.95
Hearts & Diamonds/Hi-Lo Basic VIC20 — £5.95
Machine Code Monitor VIC20—£14.95
Hangman/Super Docker ZX81-16K £4.95
Bouncing Gorillas ZX81-16K—£4.95

all games £5.95

- [ ] VIC-20 Machine Code Monitor @ £14.95 each
- [ ] Lunar Rescue @ £5.95 each
- [ ] Demon Driver @ £5.95 each
- [ ] Applebug/Crazy Climber (2 pack) @ £5.95 each
- [ ] Nuclear Attack/Grand Prix (2 pack) @ £5.95 each
- [ ] Hearts & Diamonds/Hi-Lo (2 pack) @ £5.95 each
- [ ] Space Assault @ £5.95 each-For 3K & 8K VIC-20

For any VIC-20

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Simply Write for 64

At first glance Simply Write certainly has potential. For a start, it has a total of 697 lines of text available in memory, which equates to about six pages of A4.

If you try to use all that space in a single document however you will suffer problems with the Basic garbage collection routine, of which more later. Still even this is not a major restriction: you can link files together for printing, giving virtually unlimited text in a single document.

You can also access files that have been created by a Pet or Vic, provided you re-format them first to the correct screen size.

Functions available

The disk version loads very quickly; and typing RUN gives you the option of selecting an RS232-type printer connected to the User Port (note that the package does not support a parallel printer from this port).

Next, the main menu appears. This is fairly comprehensive – it gives the majority of the functions you would expect, including the ability to redefine any of the keys on the keyboard.

Typing **W** puts you in *Write* mode where you can enter text rather like using a typewriter. The words wrap around at the edge of the screen – making them a little difficult to read, though this does not of course affect the final printed version. The only time you need to press RETURN is at the end of a paragraph.

The cursor keys can be used to move around the screen; and the INSERT and DELETE keys function as normal, allowing good full screen editing.

The function keys are also used well, most of them enabling rapid movement through the document or jumping to the end of a line. Other function key facilities include setting tabs and calling up the main menu.

There are a number of *block* commands which allow whole sections of text to be deleted, moved or inserted. The blocks are specified by typing **C** and **J** in the extreme left margin and using the F1 function key to return to the main menu; you then select which facility you want. Typing (and) on the same line allows you to delete, insert or move a single line only.

The block commands only operate on whole lines, though. If you want to process only part of a line (the beginning or end of a sentence, perhaps) you must insert spaces manually until only the text required remains on the line.

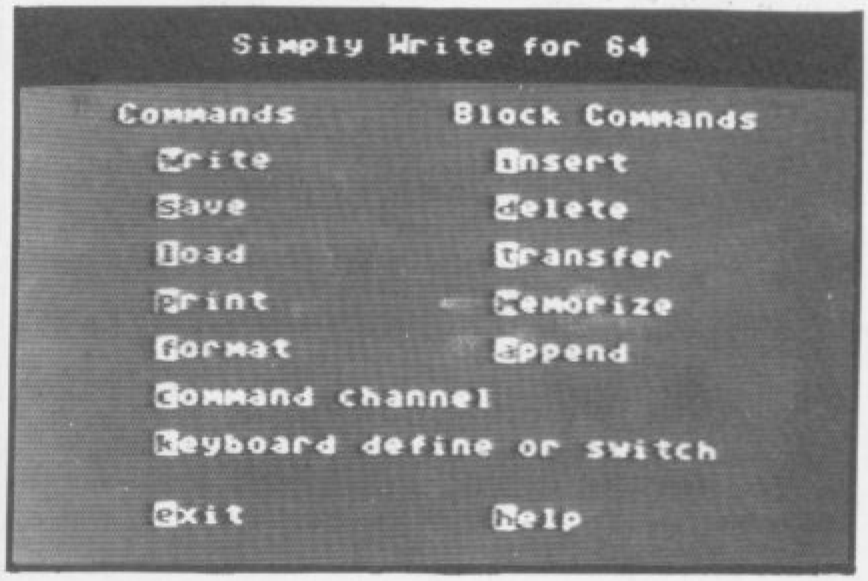
After carrying out the block function you use the *Format* command to close up any unwanted gaps.

Output

Like many WP packages for home micros the text on screen bears little resemblance to the final printed output. That's because Simply Write formats only when it actually prints; and there is no 'preview' facility.

A number of in-text formatting commands are available and these must all appear at the beginning of a new line – they are selected by preceeding the command with an up-arrow. It doesn't matter if you forget to put them in at the start of your document, since you can easily add them before you print.

A good trick is to save a 'blank' letter containing all the relevant in-text formatting commands at the beginning of the letter, together with your address block; you then load the 'blank' each time you write a letter and just add the text. This saves time on retyping commonly-used commands.



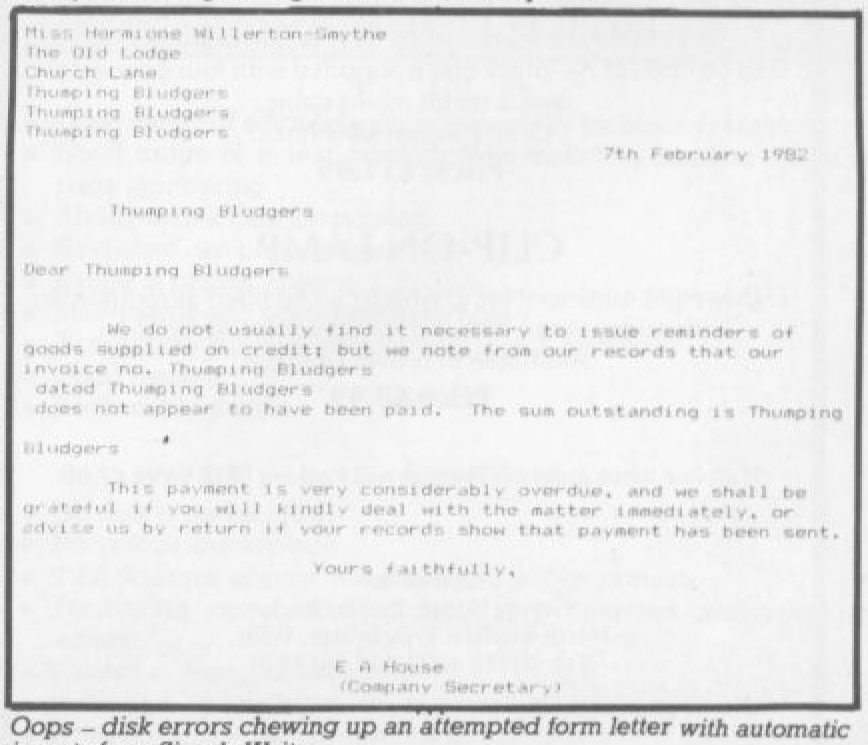
Page lengths, margins, line spacing and similar specifications for the final document are normally set at the beginning of a document. But there are also a number of other in-text commands which can be included anywhere within a document. To centre lines of text, for instance, the command **ce=2** will centre the next two lines.

New pages can be forced if the number of lines remaining is less than the number 'X' in the command **pf=x**. Text can be justified (the margins can be made level) by setting **ju=1**; this is cancelled simply by **ju=0**.

Tabs are set by defining up to eight **tN=X** commands, where 'N' is the tab number and 'X' is the character position of the tab – these tabs are subsequently selected by pressing F3 once for each tab position. A chequered square appears on the screen for each tab position required, but each group of tab markers has to start on a new line; thus a setting of eight tabs takes up eight lines on the screen.

Page Headers and page numbering are set with **ph=heading** and **pn=x** (where 'X' is the first page number). These allow professional looking documents to be produced.

There are a total of 23 in-text commands and between them they give a comprehensive range of facilities. They take a little practice to get right, but once mastered they're fairly easy to remember. Should you forget any of them, the HELP facility on the main menu will display the commands and their meanings on the screen – a useful facility to save you hunting through the manual every time.



Miss Hermione Willerton-Smythe
The Old Lodge
Church Lane
Thumping Bludgers
Thumping Bludgers
Thumping Bludgers

7th February 1982

Thumping Bludgers

Dear Thumping Bludgers

We do not usually find it necessary to issue reminders of goods supplied on credit; but we note from our records that our invoice no. Thumping Bludgers
dated Thumping Bludgers
does not appear to have been paid. The sum outstanding is Thumping

Bludgers

This payment is very considerably overdue, and we shall be grateful if you will kindly deal with the matter immediately, or advise us by return if your records show that payment has been sent.

Yours faithfully,

E A House
(Company Secretary)

Oops – disk errors chewing up an attempted form letter with automatic inserts from Simply Write.

Printers

Simply Write can use a number of different printers, connected either to the User Port (RS232 only) or the Serial Port. The latter includes all the Commodore printers and any others with appropriate interfacing.

Simply Write does not however have any built-in facilities to take advantage of things like superscript, subscript and underlining – even for the normal Commodore printers. There is an option though to send ASCII characters directly to the printer using the **ch=x** command, where 'X' is the value of the required ASCII character; theoretically this can be used with both Commodore and non-Commodore printers to enable the extra facilities to be accessed (several ASCII codes initiate printer control functions).

In practice this often didn't work, at least it didn't with an Epson FX-80 connected via the serial port; often the codes simply had no effect. Since the sending of ASCII codes *does* work on this printer with other word processing programs, you would be wise to check if you want to use Simply Write with any non-Commodore printer . . .

Other facilities

Like most WP programs these days, Simply Write can output 'form letters' – a standard letter has the relevant 'blanks' automatically filled in from a file on disk. This works well and it is simple to set up, but beware of disk errors; if one occurs while inputting an address, for example, the program carries on running and prints the last line it read in every 'blank' in the letter. The results are somewhat amusing, but are not calculated to keep down the blood pressure of the user!

There is a very useful facility to redefine all or part of the keyboard. This allows keys to be set to either an ASCII value or to another character such as a graphics character. You then the option of switching between the old and the 'new' keyboard. If you SAVE a letter after redefining keys in this way, the 'new' keyboard is saved along with the letter; very handy.

There is one snag when defining keys to control codes (ASCII 27, for instance). It becomes almost impossible to edit a line containing these codes. For a start they are non-printing, so they can't be seen: and if the cursor passes over them they are actioned immediately – with somewhat alarming consequences. I also found that I obtained peculiar side-effects after redefining keys to control codes, such as spaces being printed as asterisks. Conclusion? Although key definition is useful it should also be treated with caution.

Finally, two other useful commands from the main menu: *Memorise* allows you to save a specified block of text onto disk or tape, with a further option to delete it from the document immediately afterwards. And *Append* allows you to add text from a tape or disk onto the end of the current document. Both allow blocks of 'standard' text to be saved and retrieved easily – ideal if you are making up a document from commonly used paragraphs.

The manual

The manual is very comprehensive and covers all the facilities: it has a good index and is easy to use and understand. It falls down slightly on the method of binding, though – my copy began to come apart after only a few day's use.

To be completely fair to Simply Write itself, the manual *does* point out some (but not all) of the shortcomings I have noted. I feel though that this is taking the easy way out: and I would have preferred that Simple Software had done something about them rather than merely document their existence.

SIMPLY WRITE COMMANDS

Main menu

W	Write new text (697 lines maximum)
S	Save text on disk or cassette (uses device numbers)
L	Load text
M	Memorise (save) a marked block of text
A	Append – loads a block of text and adds it to the text already in memory
T	Transfer (move) a block of text
D	Delete a marked block of text
I	Insert text at specified point
P	Print text (printer and device number can be amended if needed)
F	Formats text (tidies it up removing unwanted gaps etc)
K	redefines Keyboard (allows redefinition of keys or selection of 'new' or old keyboard)
C	Command channel to disk (allows disk commands to be sent; scratch, initialise etc)
H	Help – displays the in-text commands and their meanings

Screen/Editing Commands

HOME	moves cursor to top of page
CRSR	normal cursor controls
[	marks first line of block
]	marks last line of block
INST	insert character
DEL	delete character
RETURN	start new line
RVS ON	toggle between 'Caps' mode (only alpha chars are upper case) and normal upper/lower case mode
f1	return to main menu
f2	move to end of page
f3	set tab
f4	move to end of line
f5	move back one page
f6	move to start of text
f7	move forward one page
f8	move to end of text

Simply Write on balance

For

- Good range of editing facilities especially for block operations
- Good range of in-text print controls including headers and auto page numbering
- Ability to link files for printing
- Keyboard can be redefined
- Range of printer options
- Mail-merge and document assembly
- Accepts documents from Pet and Vic-20 versions
- Good manual
- Reasonably priced

Against

- No disk error handling
- No search and replace
- Text does not appear on screen as it will be printed
- Formatting commands produce very cluttered document on screen
- Cannot access disk directory
- Basic garbage collection routine can be a nuisance
- Does not make use of colour facilities

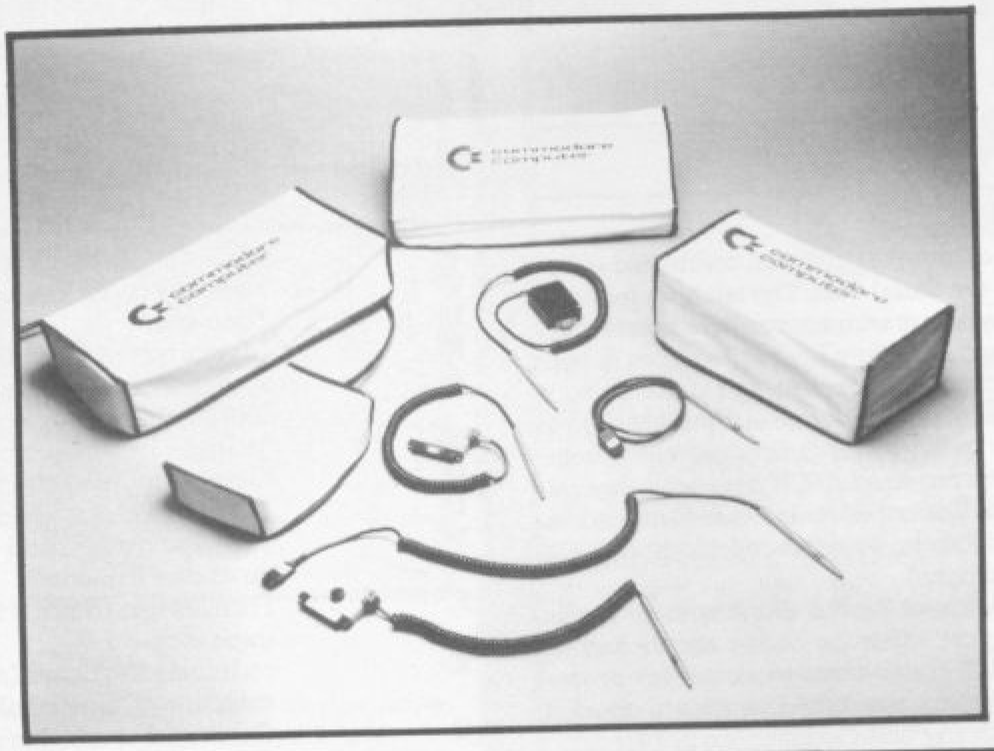
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We offer the best software for the Commodore 64. Much of its comes from our own programmers, but we also market the best software we can find from other software companies. So if you want the best, take a look at our catalogue.

BUSINESS SOFTWARE

In our opinion the 64 is one of the most powerful business machines around. Don't be fooled by the price — just make the most of it! If you want a spreadsheet program that's powerful, but easy to use, try BUSICALC 2. At £69 plus VAT on tape or £71 plus VAT on disc it is much cheaper than comparable programs — and so easy to learn that you'll hardly need to use the excellent manual.

For your word processing needs we recommend VIZAWRITE. We can now offer VIZAWRITE in a cartridge at £89.95 including VAT (store text on tape or disk), or for disk users only we can offer VIZAWRITE and VIZASPELL on one disk for just £99.95 including VAT.

PROGRAMMING AIDS

If you can't afford a disk unit — but find tape loading tedious, you need the ARROW cartridge which will LOAD or SAVE programs at 7 to 8 times normal speed (programs must first be SAVED using ARROW). A bargain at £39 plus VAT.

The VICTREE cartridge has over 40 programming aid commands (including a RENUMBER that works, advanced toolkit commands, and Basic 4 disk commands) all at a new low price of £49 plus VAT. Machine code programmers will probably be more interested inour ZOOM super monitor (£10 plus VAT on tape) or our MIKRO ASSEMBLER cartridge, an easy-to-use full-featured asembler plus monitor for £50 plus VAT.

ARCADE & FANTASY GAMES

WE stock some of the best games around. We reckon STIX is the best arcade game ever for the 64, but our CRAZY KONG can't be far behind. We beg to disaagree with a recent reviewer about KAKTUS — the graphics are very original, but if you want something really different try 3D-GLOOPER, a sort of three-dimensional P*cm*n game. All these machine code arcade games cost £8.95 including VAT. At the same price you might prefer our new fantasy game with sprite graphics, HALLS OF DEATH.

SUPERSOFT

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Telephone: 01-861 1166

Limitations

There are a number of limiations to Simply Write which detract from its otherwise good facilities.

For a start it is written in Basic which is a little unusual in this increasingly competitve market. It suffers from two major drawbacks, only one of which can be attributed to the use of Basic.

The first is the 'garbage' collection routine' with which most CBM users will be familiar. For those who are not, this is the re-organising of the 'string' area of memory to give more available space and it consumes a finite amount of time. While it is happening, the computer cannot do anything else and the system appears to 'freeze' until the garbage collection is complete.

To be fair, the manual points this out in the instructions, but the fact remains that with only 20 or so lines of text the 'freezing' effect is noticeable; with 100 or more lines it becomes a nuisance.

The second fault is potentially much more serious. The program appears to be a direct conversion from the cassette based version since there is no check on the disk error channel. The result is that the program totally ignores any fault or error when accessing the disk and either hangs-up waiting for an input that never comes or carries on with the last item it read.

Since even a simple mistake such as specifying the wrong file name generates a disk error it is inconceivable that a disk based program cannot recognise the fact and give some appropriate message; to continue as if nothing had happened is certain to cause the newcomer to WP some real headaches. In many cases it also guarantees that you have to restart the program and you may lose some, if not all of your typing as a result. An experienced programmer could amend the Basic program to overcome this, but a beginner would be completely stuck.

In a program costing £46 the writers really must pay more attention to checking things like this. Another major omission is that it cannot access the disk directory. To read the directory involves exiting from the program and using a machine code routine to avoid disturbing the Basic area. Typing 'LOAD"$",8' will overwrite the WP program which means that your text disappears as well.

This is really not good enough for a disk-based program. And facilities that are conspicuous by their absence, notably the chance to change the colour of either the text or the screen: and, more important, any sort of 'search and replace' option. Neither of these is vital, but they add considerably to the flexibility of a WP package – and then would not have been difficult to incorporate. Search-and-replace in particular is the kind of thing you expect from (and indeed find in) most word processing packages.

Conclusions

Just to make sure I wasn't being too hard on the program I lent it to a relative beginner with no WP experience at all; I also gave him a couple of the more expensive packages. His verdict? "I would certainly use Simply Write if I couldn't afford any more since it does do the job, but I think I'd rather save up some more money and go for one of the better packages costing £70 to £80".

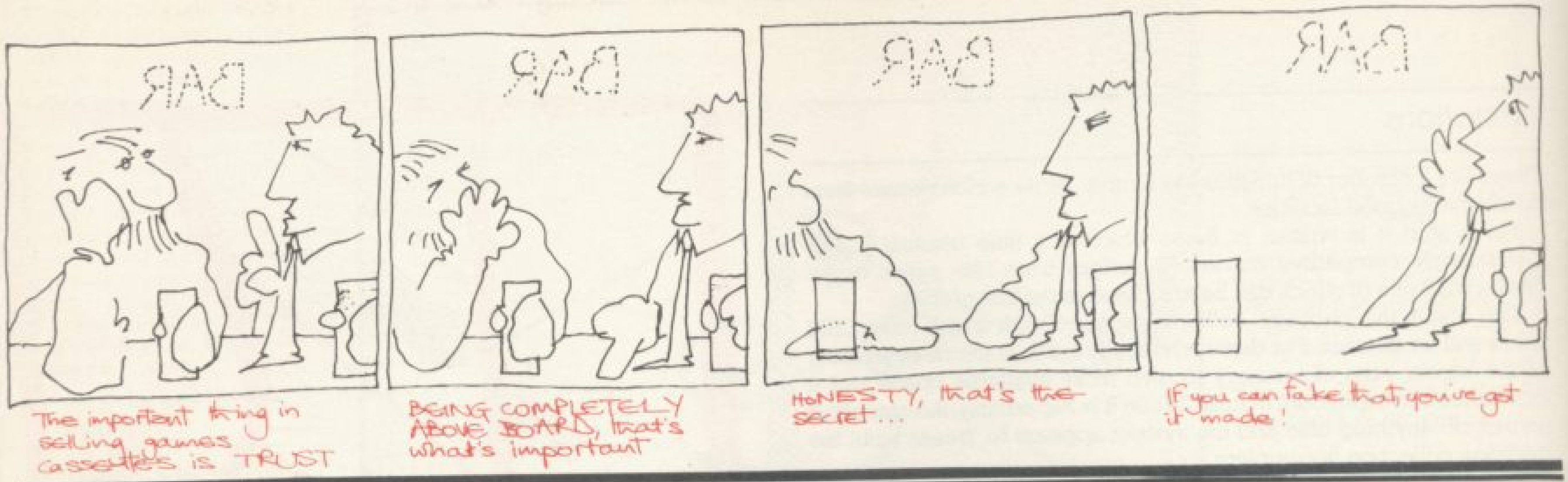
At £46, Simply Write is one of the cheapest WP packages currently available for the 64. It has some good facilities, including page headers and page numbering: and if you have good documents that have been created by other versions you may well wish to continue using a familiar package. It is certainly straightforward to use and the commands are fairly easy to remember.

Nevertheless, when compared to other WP packages it begins to show its weaknesses. The lack of a disk error handling routine is frankly unforgivable even though you could probably live with the other omissions. Certainly for moderate home use it has its place; but for any quantity of WP, I feel the weaknesses would become too apparent.



Next month I shall be looking at Wordcraft 40 and Vizawrite. The competition starts hotting up!

Under review:	**Simply Write for 64**
Desctiption:	Word processor for the 64
Supplier:	Simple Software 15 Havelock Road Brighton Sussex BN1 8GL
Price:	**£46**
Summary:	Good price and many features but some omissions and poor disk error handling

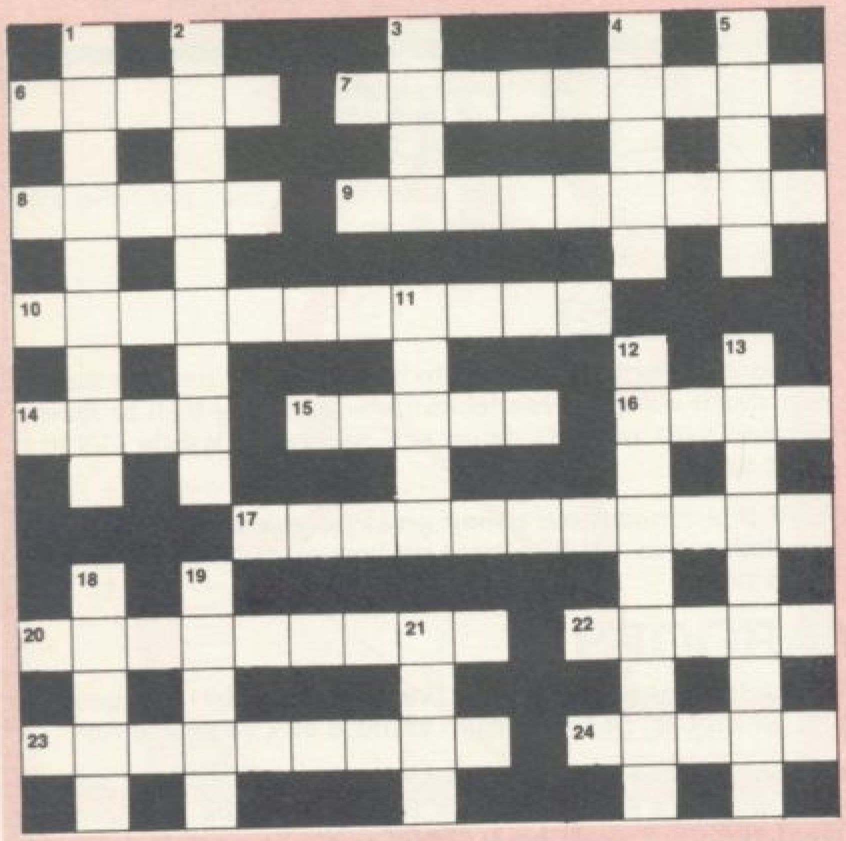


CROSSWORD

Another chance to win yourself a Vicwear sweatshirt!!!

Prizes go to the first five correct entries to arrive by 14 November at: Commodore User, The Metropolitan, Enfield Road, London N1 5AZ. (Please mark your envelope Crossword Competition.) All completed crosswords must be accompanied by an entry form – (remember to state your size, S, M, L, XL)

Answers, winners and a new contest in next month's issue. Meanwhile, happy solving. Friends and accomplices of Paradox are excluded from all competitions.



CLUES ACROSS

6 Have fun at Christmas (5)
7 In the red? Vi's kid gets there faster with a computer (4,5)
8 Here, old soldier answers you all (5)
9 Make a mess of mince; rent addition for programming (9)
10 Mistake in your Inland Revenue return program for living with your best friend's spouse? (6,5)
14 Novice's demeanour in beast's hideaway (4)
15 Leave the Nautilus! Jump! (5)
16ac, 2dn Go back to square one (4,4,5)
17 Expert regularly at meadow's end with goat (11)
20 Routine stop (9)
22 Confused mates get the point and fail by omission (5)
23 Rude eyeless native mixed up in hazardous enterprise (9)
24 Drop that micro-pancake (5)

CLUES DOWN

1 Unforgettable A to Z (6,3)
2 (see 16ac)
3 Air sounds nasty (4)
4 Best number (5)
5 Do alter the National Trust's five directions (5)
11 RUN/STOP and RESTART in the trees (5)
12 Mix-up on rice and guns (9)
13 I'm awash in solid gin for reverence ... (9)
18 ... but I'm not inside maliciously (5)
19 ... because it's Saturday Night and I'm really hot (5)
21 A bit of a compartmentalisation (4)

CROSSWORD ENTRY FORM

Name: ....

Address: ....

....

....

Size: ☐S ☐M ☐L ☐XL

Send to: Crossword Competition, Commodore User, The Metropolitan, Enfield Road, London N1 5AZ.

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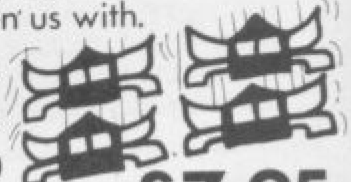
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The Architecture of the 64

by Jim Butterfield

Let's build ourselves a Commodore 64 – at least in principle. We'll put the memory elements together and see how they all fit.

Memory

We start with a full 64K of RAM. That's the maximum amount of memory that the 6510 chip can address.

If we stopped at this point, we'd have problems. First of all, the screen is fed from memory; but it would contain nonsense. We'll need to put in two extra things: a video chip, and a character generator for the video chip, and a character generator for the video chip to use. Then again, we have no programs of any sort, and no way to get them into RAM.

Building it out

Here's what we will do: we'll add the extra features we need by piling them on top of RAM. That way, RAM will be 'hidden' – if we look at elements. But we'll include a set of switches which will allow us to flip away the overlaying material and expose the RAM beneath any time we choose. More about these later.

Keep in mind that the RAM is still there, but it's hidden behind the new memory chips.

Input/output

We'll take the block of memory hexadecimal D000 to DFFF and reserve it for our interface chips. This includes two CIAs for timing and input/output; a SID chip for sound; and a video chip to deliver a screen to the television set.

About the 6566 video chip. Its 'registers' are located at hex D000 to D02E; these locations control how the chip works.

But when the video chip needs information to put on the screen, it gets it directly from RAM memory; for example, the usual place for the screen characters is hex 0400 to 07E7.

There's a distinction here: we control or check the chip by using its register addresses, but the chip gets information from almost anywhere it likes.

As mentioned, the video chip needs to look at RAM to get characters for the screen. It also needs to look somewhere else to get a 'picture' of each character; this allows it to light up the individual dots, or 'pixels', that make up a character.

There needs to be a table which gives details of each character: what it looks like, how to draw it. This is called the 'character base' table – hardware types may just call it the 'character generator'.

We could put this character base table in RAM and point the video chip to it. In fact, we are likely to do this if we want to define our own graphics. But on a standard 64, we'd just as soon have these characters built in – in other words, we'll put the character base table into ROM memory.

Now comes the tricky bit. We will put our ROM character base (it's 4K long when we allow for both graphics and text) into locations hex D000 to DFFF.

Wait a minute! We just put our interface chips there!

No problem. We just pile the memory elements higher. The ROM character base sits above the RAM, and then we put the I/O on top. Any time we PEEK these locations, we'll see the I/O. The video chip, by the way, has a special circuit allowing it to go directly to the ROM character base. So there's no confusion there.

If you wanted to look at the character ROM, you'd have to flip it to the top somehow. It turns out you are allowed to do this: clearing bit 2 (mask 4) of address 1 to zero will do the trick ... but be sure you disable the interrupt first, or you're in serious trouble. After all, the interrupt routines expect the I/O to be in place. Bit 2 of address 0 is called the CHAREN control line.

Let's look at a small part of the character base ... in Basic! Be sure to do this on a single line, or as part of a program. First, to turn the interrupt off and back on again:

POKE 56333,127:... ... : POKE 56333,129

Now, while the interrupt is in force, flip in the character base:

POKE 56333,127: POKE 1,51: ... POKE 1,55: POKE 56333,129

Finally, let's peek at part of a character:

POKE 56333,127: POKE 1,51:X=PEEK(53248): POKE 1,55:POKE 56333, 129:PRINT X

You should see a value of 60 – this is the top of the "a" character. To see its pixels, we would write it in binary as ..xxxx.. And to see the next line of pixels we would repeat the above code with

X=PEEK(53249)

Remember that this is ROM; we can PEEK but can't POKE. If we wanted a new character set, we would point the Video Chip to some new location.

Kernal ROM

To allow the computer to work at all, we must have an operating system in place. The 64's is called the Kernal: it's in ROM, and placed above RAM at addresses E000 to FFFF.

We can flip the Kernal away and expose the RAM beneath by clearing bit 1 (mask 2) of address 1. Be very careful! The computer can't exist for long without an operating system. Either put one into the RAM, or be prepared for the crash!

Even if you flip out the Kernal for a moment, you must be sure to disable the interrupt. The interrupt vectors themselves are in the Kernal; if the interrupt strikes while the Kernal is flipped away, we'll have utter confusion.

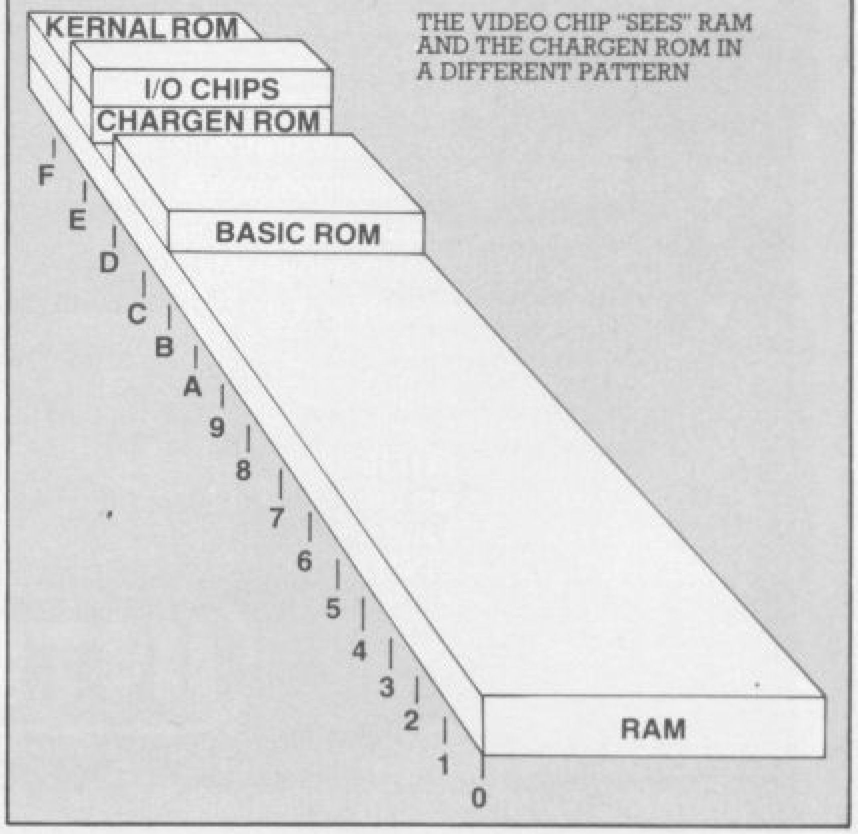
Flipping out the Kernal automatically flips out Basic as well. So bit 1 of address 1, called the HIMEN control bit, switches out both ROMs. We can switch Basic alone, however, by using bit 0 – the LOMEM control bit.

Basic ROM

To run Basic, we have another ROM which is placed above RAM at addresses A000 to BFFF. We may flip it out by clearing bit 0 (mask 1) of address 1.

This is a very useful thing to do. When a word processor, spread sheet calculator, or other program is in the computer, we may not need Basic at all. Flip it away, and we have extra memory for your program.

COMMODORE 64 ARCHITECTURE



Do your own Basic

We can do even more. If we copy Basic – carefully! – from its ROM into the RAM behind it, we can get Basic-in-RAM ... a Basic we can change to meet our own needs. Let's do this, just to show how:

100 FOR J=40960 to 49151
110 POKE J,PEEK(J)
120 NEXT J

Run the program. It will take a minute or so. While it's running, let's talk about the curious line 110. What's the point in POKE-ing a value into memory identical to what's already there? Here's the secret: when we PEEK, we see the Basic ROM; but when we POKE, we store information into the RAM beneath.

The program should say READY by now; we have made a copy of Basic in the corresponding RAM. Flip the ROM away with **POKE 1,54.** If the cursor is still flashing, we're there. Basic is now in RAM. How can we prove this?

Let's try to fix one of my pet peeves (PET peeves?). Whenever I try to take the ASC value of a null string, Basic refuses. Try it: **PRINT ASC("")** will yield an ?ILLEGAL QUANTITY ERROR.

Now, it's my fixation that you should be able to take tha ASCII value of a null string, and have Basic give you a value of zero. (Don't ask why ... that would take a couple more pages.)

By peering inside Basic, I have established that the situation can be changed by modifying the contents of address 46991. There is usually a value of 8 there.

Normally, we couldn't change it: it's in ROM. But now Basic is in RAM, and we'll change the ASC function slightly by ...

POKE 46991,5

Now try PRINT ASC("") again. It will print a value of zero. In every other way, Basic is exactly the same.

Just for fun you can change some of Basic's keywords or error message to create your own style of machine. For example, **POKE 41122,69** changes the FOR keyword ... you must type the new keyword to get the FOR action. Say LIST and see how line 100 has changed. Alternatively, **POKE 41230,85;** now you must say LUST instead of LIST.

You may go back to ROM Basic at any time with a **POKE 1,55.**

Combination switch

When we use the HIMEN control to flip out the Kernal, Basic ROM is also removed. Is there any point in flipping both HIMEN and LOMEN? If you do, the I/O and character generator also disappear, giving you a solid 64K of RAM. You can't talk to anybody, since you have no I/O – but you can do it.

We have named three control lines: CHAREN, which flips I/O with the character base; HIRAM, which flips out Kernal and Basic ROMs; and LORAM, which controls Basic. In my memory maps I've called them D-ROM switch, EF-RAM switch, and AB-RAM switch in an attempt to make them more descriptive.

But there are two other control lines .. and your program cannot get to them. They are called EXROM and GAME, and may be changed only by plugging a cartridge into the expansion slot. When these lines are switched by appropriate wiring inside the cartridge, the memory map changes once again... but that's another story (*Maybe another article? Ed.*)

For the first time, the machine's architecture is at your disposal. If you don't like Basic, throw it out and replace it with your own. The same is true of the Kernal operating system ... it's accessible or replaceable.

New horizons are opening. We'll need to do a lot of travelling to reach them.

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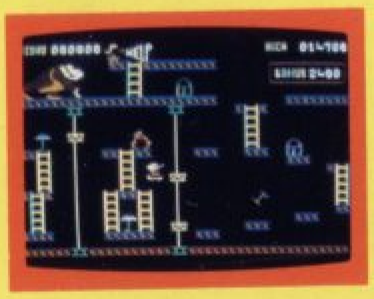
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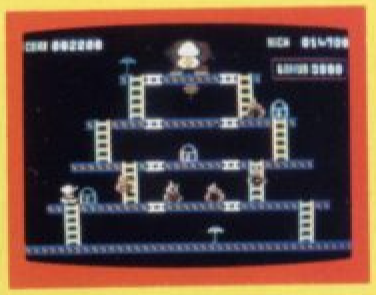
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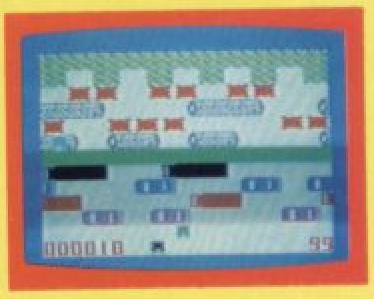
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Todd's Lore

Questions people ask me

The Commodore 64 has been around long enough now for people to start asking questions about it: and so I thought that for my first 64 Lore in *Commodore User* I'd rummage around my postbag and pick out some of the questions that people have been asking over the last few months.

Why does the screen go blank when I use cassettes?

When you LOAD a program from cassette, the 64 first asks you to PRESS PLAY (unless of course you've already done it!) and then turns the screen off while hunting for the program.

To show that the program has been found, the screen is turned on again with the FOUND message; and then it's turned off again after 10 seconds as the program is loaded. Of course, if you don't want to wait 10 seconds you can press the CBM key and the program will load immediately. The same sequence occurs during other cassette operations too, such as SAVE and file reading or writing.

Yes – but why? Well, the problem lay in the timing. The information on the tape is encoded as carefully-timed pulses: and when reading the data back again, the 64 must be able to time these pulses accurately.

This would be fine if the microprocessor at the heart of the 64 had it all its own way, but it doesn't. The Video Interface Chip (yes – another VIC – but on the 64 we refer to it as VIC2 or VICII) needs to get at the same areas of memory as the microprocessor because that is where screen memory and character shapes are stored; and so it effectively turns the microprocessor off whenever it needs to get at those sections of RAM.

This results in the timing operations being disrupted periodically as the VICII grabs information from memory. Because this would cause problems, the 64 turns the video chip off when timing is critical.

Incidentally it fails to do this when using the disk or printer, and this can also cause problems. If you are using a 1541 disk drive (or a 1540 upgraded to a 1541) you should have no problems as this has been arranged to work with these timing differences.

If you haven't, or you are using a printer, it is probably safest to turn the screen off yourself just before communicating with an external device, and then on again just after.

Screen off: POKE 53265,11
Screen on: POKE 53265,27 (or press STOP+ RESTORE,

Why is it that some colour combinations of character and background become almost totally illegible, while others work fine?

It's all down to how colour television works. What you see on a colour TV screen is actually made up from three separate pictures: one green, one blue, the other red. And this is how the signal starts off and how it ends up.

The signal from the 64 is made up from these three images, but it is encoded as two separate signals. The first is the black-and-white component of the picture (which you can see by turning down the colour control on the television set) and the other has only the colour information in it.

This colour information is squeezed into the signal from the 64 and is superimposed on the black and white image in the TV set. This colour picture does not need to have such a high definition as the black and white part; the eye cannot see great detail in colour and needs only broad areas of colour, as long as the detail is provided in the black and white picture.

With some character and background colour combinations (for instance RED (2) on a blue (6) background) the black-and-white intensity for the background and character are virtually identical. As before, try turning the colour right down and see how difficult it is to see certain colour combinations.

In a perfect set-up the colour picture would have enough definition to make the characters legible even when the black and white side doesn't – but it can't and so all you see is a murky patch of colour.

So the solution is to choose character and background colours whose black and white images are suitably contrasty and the following table gives a very rough guide as to the black and white intensity of each colour:

Very low intensity:	**BLACK (0)**
Medium intensity:	**RED (2)**
	BLUE (6)
	BROWN (9)
	DK GREY (11)
High intensity:	**PURPLE (4)**
	GREEN (5)
	ORANGE (8)
	LT RED (10)
	MID GREY (12)
	LT BLUE (14)
Very high intensity:	**WHITE (1)**
	CYAN (3)
	YELLOW (7)
	LT GREEN (13)
	LT GREY (15)

The BBC micro has an RGB output – what is it, and how can I get one on the 64?

As I said in the previous section, there are actually three colour pictures to start with: and on the 64 these are then encoded into a black-and-white-plus-colour picture. In some computers, it is possible to get at the three colour pictures before they are encoded – hence the RGB (red, green, blue) output. Since the greatest loss of colour definition occurs once the signal has been encoded, this means that an RGB output gives the maximum definition and clarity possible.

The 64 does have an RGB signal, but it is impossible to get at as it's inside the VICII chip itself. And only the encoded colour signal is available on the video DIN plug at the back of the 64; this is what you should feed to the back of a colour monitor, if that's what you are using.

This signal gets processed yet again by the modulator to turn it into a form suitable for a domestic TV which and this further degrades the signal – so for the best possible definition it is sensible to use a video monitor. The difference can be quite marked, but nowhere near as much as they would be if the 64 had an RGB output.

Perhaps Commodore will include an RGB output on its next generation of computers – but then again, perhaps it won't!

Sometimes the internal time variables TI and TI$ show the incorrect time. Why is this, and is there anything that can be done to stop it?

Sixty times a second, the 64 performs its own internal housekeeping routines. These include a check for keys pressed on the keyboard: and at the same time this adds one to the TI variable.

Unfortunately, the cassette and serial port commands upset this and the TI variable doesn't get incremented as it should. The result? TI appears to have lost some time after an operation involving cassette, disk or printer. There is nothing that can practically solve this problem – you'll just have to be aware that it happens.

The 64 does have two other internal timers which are not affected in this way but which are rather difficult to get at. I will have more to say on this another time ...

Why do odd things sometimes happen when I delete characters on the screen?

This is due to a bug in the 64, and only occurs when using the DEL key with the cursor at the start of a line. It can be demonstrated as follows: clear the screen and move the cursor down a couple of lines. Then fill the line with characters.

Now, position the cursor back at the start of the line, change the character colour and then press DEL. The cursor should move back one space and position itself at the end of the previous line: and the character below it immediately changes colour!

If the cursor backs up to a line that was the end of a wrapped-around 80-character line, the change of colour will occur one line further down – although you won't see it unless there's a character at that position.

It's messy, but shouldn't cause any serious problems ... unless you are on the bottom line of the screen and back the cursor up again (using the DEL key) on to the end of an 80-character line. Then the screen editor will still try to change the colour, but it's off the screen.

It actually puts the colour into a control register and disables the keyboard, including the STOP key! In fact, you will get the LOAD and RUN commands printed on the screen as if you'd pressed SHIFT-RUN. If you have a program already in the 64 at the time, the program *will* run – but it will be unstoppable!

This only occurs with certain character colours. So, by changing the character colour to one of the following the problem should not occur:

BLACK
WHITE
PURPLE
GREEN
ORANGE
BROWN
GREY2
LIGHT GREEN

If you do get caught, there is a partial solution – as long as you have a cassette machine connected. Pressing SHIFT-3 will give the PRESS PLAY message – do that and the screen will go blank, but the STOP+RESTORE keys will now reset the 64.

How easy is it to convert Pet programs on to the 64?

Well, it all depends on what sort of Pet program you're talking about. If it's one which contains no PEEK, POKE, SYS or WAIT commands, then it will work with no attention at all.

If it contains any SYS commands, though, it's unlikely to work without a great deal of effort.

If it contains only PEEK, POKE and WAIT commands, it all depends on which locations these are directed at. If they use addresses other than the screen, conversion is a little tricky: I'll be covering this at a later date.

The Pet has its screen at locations 32768 to 33767, the 64 has them 1024 to 1123. But the 64 can have its screen moved fairly easily by the following sequence:

```
POKE 53272,4: POKE 56576,5:
  POKE 648,128
POKE 46,128: POKE 44,4:
  POKE 1024,0: NEW
```

... and then clear the screen. The first two POKEs tell the 64 hardware where the screen is, the third tells the 64 operating system that it has moved to 32768. The other POKEs set up the 64 so that it stores its Basic programs where the Pet did.

But as always there's a catch. Although the 64 will now accept Pet screen POKEs *you won't be able to see them* (unless you've got an early American 64). Why? When the screen is cleared the 64 resets the colours of all characters on the screen *to the same as the background* ...

There is a fairly easy solution to this: to force a different background colour whenever the screen is cleared. I would suggest setting up a small subroutine as follows:

```
63400 ZZ=PEEK(53281):
      POKE 53281,PEEK(646)
63401 PRINT "[clr]";
63402 POKE 53281,ZZ
63403 RETURN
```

Every time the Pet program requires a clear screen, you can now replace it with a GOSUB 63400. The routine preserves the current background colour, changes it to the current character colour, clears the screen (now all colour locations have the character colour in them) and then restores the background.

Extra High-res Commands

by C French

This one needs at least 8K expansion. Written in machine code, it adds eleven new high-resolution commands to Basic.

Unlike many extensions to the command set, this bunch scores because you don't need any individual SYS calls to get at them. You can also use them with constants or variables as parameters, for example . . .

10 FOR T=1 TO 10: PLOT T,1: NEXT

To load the commands, type:

POKE 642,36: SYS 64824: LOAD

Then RUN this program, whereupon you'll be ready to start writing your own code using the commands. Your programs can be SAVEd and LOADed as normal.

When your program is ready switch to HI-RES mode by **SYS 4612** To return to normal (needed when creating programs), use **SYS 8900.**

All commands begin with a hash symbol (#) and end with a colon. Commands may be followed by up to two values: these may be shown as a figure or a variable.

Variables must be preceded by an apostrophe. If the variable name is only one character long, it must also be followed by a space. Examples:

10 #COLOUR55,2:
10 #PLOT'XX,123:
10 #DRAW'X ,'Y:

```
1 REM **** HI RES COMMANDS ****
2 REM **** BY C FRENCH ****
100 RESTORE:FORT=4610TO5084:READA:POKET,A:NEXT
103 FORT=8190TO8933:READA:POKET,A:NEXT:NEW
4610 DATA18,0,169,76,133,115,169,166,133,116
4620 DATA169,34,133,117,96,234,208,2,230,123
4630 DATA13,82,177,122,133,78,169,81,133,79
4640 DATA230,122,208,2,230,123,177,122,240,46
4650 DATA234,24,201,58,176,38,201,39,208,3
4660 DATA76,109,19,201,44,208,5,230,79,208
4670 DATA225,234,56,233,48,133,30,177,79,10
4680 DATA10,10,24,113,79,113,79,101,30,145
4690 DATA79,24,144,202,208,200,76,97,18,234
4700 DATA234,234,234,234,161,165,78,201,67,208
4710 DATA37,165,81,141,161,32,165,82,24,201
4720 DATA8,176,6,141,191,32,76,136,32,201
4730 DATA16,144,3,76,209,34,56,233,8,141
4740 DATA191,32,76,160,32,24,144,231,201,66
4750 DATA208,3,76,25,34,201,70,208,26,169
4760 DATA123,141,247,33,169,0,141,216,33,169
4770 DATA240,141,216,33,165,81,133,30,165,82
4780 DATA133,31,76,143,33,201,87,208,18,169
4790 DATA131,141,247,33,169,255,141,221,33,169
4800 DATA208,141,216,33,24,144,223,201,84,208
4810 DATA3,32,78,34,201,68,208,31,169,120
4820 DATA141,96,33,141,51,33,165,9,133,28
4830 DATA165,10,133,29,165,81,133,30,133,9
4840 DATA165,82,133,31,133,10,76,145,34,201
4850 DATA69,208,5,169,128,24,144,218,201,80
4860 DATA208,11,166,81,134,9,164,82,132,10
4870 DATA76,120,32,201,85,208,11,166,81,134
4880 DATA9,164,82,134,10,76,128,32,201,86
4890 DATA208,14,166,81,164,82,32,6,32,49
4900 DATA165,160,2,145,45,96,201,83,240,1
4910 DATA96,169,8,133,78,165,10,133,29,160
4920 DATA0,177,81,133,32,165,9,133,28,56
4930 DATA38,32,144,10,166,28,164,29,32,120
4940 DATA32,24,144,7,166,28,164,29,32,211
4950 DATA19,230,28,6,32,208,231,198,78,208
4960 DATA1,96,230,29,230,81,208,2,230,82
4970 DATA24,144,202,165,45,133,28,165,46,133
4980 DATA29,162,2,230,122,208,2,230,123,177
4990 DATA122,201,32,208,1,152,149,30,202,208
5000 DATA238,134,33,160,0,165,32,209,28,208
5010 DATA35,200,165,31,209,28,208,28,200,177
5020 DATA28,41,127,133,30,200,177,28,9,128
5030 DATA10,38,33,198,30,208,249,160,0,165
5040 DATA33,145,79,76,32,18,165,28,24,105
5050 DATA7,133,28,144,204,230,29,165,48,197
5060 DATA29,176,196,76,32,18,29,197,48,104
5070 DATA170,104,168,104,96,32,6,32,73,255
5080 DATA49,165,145,165,96
8190 DATA0,0,255,255,255,255,255,255,24,224
8200 DATA152,144,3,104,104,96,192,160,176,249
8210 DATA169,20,133,166,169,0,133,165,141,6
8220 DATA34,141,7,34,141,8,34,138,72,41
8230 DATA7,141,6,34,104,74,74,74,141,8
8240 DATA34,152,72,41,15,141,7,34,104,74
8250 DATA74,74,74,170,169,0,202,48,12,24
8260 DATA105,48,144,2,230,166,230,166,76,64
8270 DATA32,174,8,34,202,48,10,24,105,16
8280 DATA144,2,230,166,76,82,32,24,109,7
8290 DATA34,144,2,230,166,133,165,169,128,174
8300 DATA6,34,202,48,4,74,76,110,32,160
```

HI-RES commands can be used as normal...with one exception. If used right after a THEN statement, the HI-RES command will operate *whether the IF condition was true or false.* To avoid this each THEN should be followed by a colon. For example:

IFA=7THEN:#PLOT 1, 1:

The HI-RES screen is a grid with horizontal dimensions 0 to 151 and vertical 0 to 1159.

All commands can be abbreviated to their initial letter.

The HI-RES commands:

#COLOUR

Format **#COLOURxx,yy:** where **xx** sets the screen and border colours (see page 134 of *Vic Guide* Book) and **yy** sets the foreground colour (page 143).

Example: **10 #COLOUR105,2:** will give a blue screen with a white bordr and a red foreground.

The #COLOUR command must be the first HI-RES command as it also prepares the HI-RES screen. To return the screen to normal use **#COLOUR ,50;**

If you wish to return to HI-RES mode or simply change the colour without erasing the screen's contents, add eight to the foreground colour. For instance, **20 #COLOUR8,10:** will give you a black screen with red foreground without spoiling the picture.

```
8310 DATA0,96,32,6,32,17,165,145,165,96
8320 DATA76,211,19,0,0,0,0,0,162,12
8330 DATA160,0,132,30,169,20,133,31,152,145
8340 DATA30,230,30,208,250,230,31,202,208,245
8350 DATA234,234,169,1,141,15,144,169,205,141
8360 DATA5,144,169,21,141,3,144,169,19,141
8370 DATA2,144,160,193,169,147,133,166,169,255
8380 DATA133,165,69,7,145,165,136,208,251,169
8390 DATA16,133,166,169,0,133,165,160,0,152
8400 DATA145,165,136,208,250,96,165,28,197,30
8410 DATA176,16,170,165,30,134,30,72,164,31
8420 DATA165,29,132,29,133,31,104,56,229,30
8430 DATA133,32,165,29,197,31,176,19,56,165
8440 DATA31,229,29,133,33,169,198,141,57,33
8450 DATA141,112,33,165,33,208,15,229,31,133
8460 DATA33,169,230,141,57,33,141,112,33,165
8470 DATA33,24,197,32,144,44,133,250,169,0
8480 DATA133,251,133,252,170,164,32,32,121,33
8490 DATA165,252,133,251,166,30,164,31,32,120
8500 DATA32,198,33,240,63,230,31,165,252,101
8510 DATA251,133,251,144,235,230,30,24,144,230
8520 DATA168,169,0,133,251,133,252,170,165,32
8530 DATA133,250,32,121,33,165,252,133,251,166
8540 DATA30,164,31,32,120,32,198,32,240,18
8550 DATA230,3,165,252,101,251,133,251,144,235
8560 DATA230,31,24,144,230,202,134,252,96,152
8570 DATA240,250,197,252,240,245,232,165,250,24
8580 DATA101,251,144,3,230,252,24,133,251,144
8590 DATA234,165,30,133,28,165,31,133,29,169
8600 DATA230,141,183,33,32,205,33,176,26,230
8610 DATA28,32,205,33,144,249,165,30,133,28
8620 DATA198,28,32,205,33,144,249,165,30,133
8630 DATA28,198,31,176,225,169,198,205,183,33
8640 DATA208,1,96,141,183,33,165,29,133,31
8650 DATA56,176,230,166,28,164,31,32,6,32
8660 DATA133,32,49,165,240,2,56,96,169,0
8670 DATA209,165,240,4,165,32,208,16,250,30
8680 DATA197,28,240,246,165,28,144,11,233,7
8690 DATA133,28,169,255,32,123,32,24,96,105
8700 DATA7,144,243,0,0,0,17,56,176,8
8710 DATA6,2,8,0,0,0,0,0,233,7
8720 DATA133,28,104,96,24,105,7,144,247,165
8730 DATA81,133,30,165,82,133,31,32,70,34
8740 DATA230,9,198,30,208,247,32,70,34,230
8750 DATA10,198,31,208,247,32,70,34,198,9
8760 DATA198,81,208,247,32,70,34,198,10,198
8770 DATA82,208,247,96,166,9,164,10,32,120
8780 DATA32,96,160,9,177,45,153,239,0,200
8790 DATA192,12,208,246,160,0,169,16,133,251
8800 DATA177,249,201,64,144,3,56,233,64,10
8810 DATA38,251,10,38,251,10,38,251,133,81
8820 DATA165,251,133,82,32,47,19,198,248,208
8830 DATA1,96,24,230,249,208,3,230,250,24
8840 DATA169,8,101,9,133,9,24,144,201,32
8850 DATA214,32,166,81,164,82,173,96,33,201
8860 DATA128,240,3,76,120,32,76,128,32,234
8870 DATA230,122,208,2,230,123,160,0,177,122
8880 DATA201,35,240,3,76,121,0,132,81,132
8890 DATA80,230,122,32,18,18,76,115,0,234
8900 DATA169,230,133,115,169,122,133,116,169,208
8910 DATA133,117,96,169,27,141,15,144,169,192
8920 DATA141,5,144,169,174,141,3,144,169,22
8930 DATA141,2,144,96
```

▶

#PLOT AND #UNPLOT
Format **#PLOTxx,yy:** a dot will be ploted at a point on the grid **xx** distance across and **yy** distance down **#UNPLOT** will clear this point.

#DRAW AND #ERASE
Format **#DRAWxx,yy:** draws a line from the last point operated upon to the point **xx,yy.**

Example: **20 #PLOT10,10:#DRAW50,50:#DRAW50,10:#DRAW10, 10:** will plot 10,10, then draw from 10,10 to 50,50, then to 50,10, and finally back to 10,10-forming a triangle.#ERASE does the same, except instead of drawing such lines it erases them.

#BOX
Format **#BOXxx,yy:** will draw a box with its top left-hand corner being the last point operated upon, with length **xx** and height **yy.**

Example: **30#PLOT10,10:#BOX50,100:** will draw a box 50 points by 100 points with its top left corner at point 10,10.

Before going on to the more complex commands you are advised to make sure you understand the last six: try them out fully.

#FILL AND#WIPE
Format **#FILL xx,yy:** will colour a shape which contains the point **xx,yy.**

Example: **20 #PLOT10,10:#BOX20,20:#FILL15,15:**

Irregular shapes may need more than one FILL Instruction to colour completely. **#WIPE** is used the same way except it will erase a shape.

#VIEW
Format **#VIEWxx,yy:** will see if point xx,yy has been plotted or not. If it has, then VW will be bigger than zero; if it is clear, VW will be zero. Therefore IFVWTHEN will be true if the point has been plotted.

Example: **20 #VIEW10,'B :IFVWTHENPRINT "Plotted":END**
30 PRINT"unplotted";END

#TEXT
Format **#TEXT:** allows you to use text on the HI-RES screen. It will print TX5, up to a length of 19 characters.

Example: this will write the time at the top of the screen...

10 TX$=".":VW-0:SYS4612:TI$-"000000"
20 TX$=TI$:#PLOT1,1:#TEXT:GOTO20

If you are going to use the #TEXTor #VIEW commands the program must start with **10 TX$=".":VW=0:SYS462.**

#SPRITE
Format **#SPRITExx,yy:** draws from the last point operated upon, the shape stored in memory locations represented by **xx,yy.** To work out xx,yy obtain the first address (AD) of the shape required then use the formulae **yy=INT (AD/256)** and **xx=AD-yy 256**

Vic's own graphics are stored from 32768 onwards. Each shape uses eight bytes and are in screen code order (page 141 of *Vic Guide*). Therefore to calculate the address of a character whose screen code is 'SC' use the formula **ADDRESS= 32768 + 8 - SC.** For example:

Character	Address	xx	yy
@	32768	0	128
A	32776	8	128
%	33064	40	129
—	33568	32	131

Review

Super Screen reviewed

by Colleen Young

Fancy a 40 column display on your Vic? Super Screen from Audiogenic is a machine-code program requiring expansion of at least 8K; it gives you a Vic that can display lines of 40 characters.

The program is loaded in the normal way – it takes about a minute to load. When the program is run it relocates to the top of memory and the screen reconfigures to a 40-column display. You will then see a blue background with the power up message printed in white, and you can start programming as normal.

The full character set and screen editing functions are retained, but it is not possible to POKE to the screen or colour locations.

Also included on the cassette is a demonstration program showing the wonders that can be achieved using Super Screen – Audiogenic (and *Commodore User*) proposes that appropriate uses would be database, word-processing and spreadsheet programs. The demonstrations are effective, the text being clear and easy to read. Audiogenic suggests that you list it to see how it was written.

Audiogenic says that the characters can be any one of eight colours. This means one colour at a time: it is not possible to have different colour characters on one screenful of text. Now, of these eight colours, the lighter ones look the best – white, cyan, green and yellow show up well, the others do not. And as for blue characters on a blue background – this strikes me as a little silly!

It is possible to have a screen display of 40 columns by 24 rows, but the 40 columns are easier to come by than the 24 rows! If a line of 40 characters or less is printed, (e.g. PRINT "HELLO"), the next line will be left blank: thus you get 12 rows on one screen, not 24. It is possible to get round this problem by padding out the string with spaces; PRINT "HELLO (35 spaces)" does away with the unwanted blank line and the 24 promised rows *can* be obtained in this fashion.

```
[illegible] Proudly Presents
***   SUPER-SCREEN   40*24 Characters   ***
          Special Functions:

* All editor functions including INSERT
  and DELETE fully operational
* Fast speed because of machine language
* Programmable character set
* 40 columns like APPLE, ATARI, BBC or
  Commodore 64, 500 and 4032
* 8 Colours for characters available
* Full screen-editor (Programmable)
* Flashing cursor
* No special hardware required
* Good readability by true descenders
* UPPER- and lower-case like typewriter
* Requires VIC-20 and at least 8K-RAM
```

Conclusion? At the price (£9.95) Super Screen is reasonable value for money if you have applications where you require more information on one screen than your 22 column Vic allows. The printing of blank lines mentioned is certainly a nuisance but can be overcome; the demonstration program is useful here.

TOMMY'S TIPS

Many people write to me from all over Europe (quite flattering really!) asking how they can convert the Vics they have bought in the States to English, Norwegian or Outer Mongolian TV standards.

The short answer is that you can't. Or rather, you can – but it would probably cost more to convert them than to buy a new one. If you are thinking of emigrating, sell your Vic before you go and buy a new one when you arrive – those people who have bought Vics in the States can only try to sell them to somebody who is going out there soon.

A few queries as well from D IY constructors building their own memory expansion units. You want to use the 2016 chip that Commodore fits in its own expansions? And you don't know where to buy the chips from? Try Semi Components on 01-941 0409.

And now on with the rest of the postbag . . .

Dear Tommy, **On page 34 of "the** ***Programmer's Reference Guide*** **it is stated that 'the WAIT statement takes the value in the memory location and performs a logical AND operation with the value in mask 1. If there is a mask 2 in the statement, the result of the first operation is exclusive-ORed with mask 2. ,**

Could you please tell me if this is fact the case? I have found that if there are two masks, the value in mask 2 is exclusive-ORed with the-memory location and then the result is ANDed with the value inmask 1 – not, as they state, the other way round.

One up to you, and a big yah boo sucks to Commodore. The WAIT statement does indeed exclusive-OR the second operand with the contents of the memory location, then AND the result with the first operand.

It might not be a bad idea if we explained what the WAIT statement does for those not already familiar with it. The WAIT statement allows you to test bits, usually those connected with the operation £ some sort of I/O device. In the general case we may want some bits to be 1s, some to be 0s and some we don't care about. The exclusive-OR allows us to turn all the bits we want to be zeros into ones without affecting the bits we want to be ones. We do this by putting a 1 into each bit position of the second argument which we want to invert in the memory location; the AND operation then allows us to ignore bits we are not interested in by putting zeros into the corresponding bit positions in the first argument.

The exclusive-OR is the optional argument, so it has to come second in the syntax.



Dear Tommy, **I would like to know what 'two's complement' is and why it is used for storing negative numbers instead of using a sign bit.**

Before looking into two's complement, let's start with one's complement. If we have a number in binary, say decimal 2 (0010) we get the one's complement by turning every '1' into a '0' and every '0' into a '1':

1101

We can get the two's complement of the original 1011 by adding 1 to the one's complement, which gives you –

1110

Now, the two's complement of number X is just −X, so 1110 should be −2. If you don't believe me, add 1 to make 1111, which is −1; then do it again to make 0000, which is 0.

Dear Tommy, **I have been trying to keep some of my alleged friends from having too close a peek at my programs. Is there a way of disabling the RUN/STOP and RESTORE function in Basic? I am fully aware of the fact that true software protection is rather elusive, but I'm only trying to keep them guessing for a while.**

The problem is that the RESTORE key causes an event called a *non-maskable interrupt* – that is, an interrupt which cannot be disabled. When an NMI happens, the 6502 jumps to a service routine in ROM just as for a maskable interrupt, IRQ, and ends up using a RAM vector at 792 and 793. As with the IRQ vector at 788 and 789, we can change this and so knock out the RESTORE key.

```
100 POKE 788,194
110 POKE 792,91: POKE
    793,255
```

Line 100 is the familiar POKE to disable the STOP key. Line 110 modifies the NMI vector to point to an RTI instruction (RTI is the asembler mnemonic for 'Return from Interrupt') which just makes the 6502 carry on where it was when the NMI occurred. The end result is that your program carries on running quite sweetly. The only way to stop it is to pull the plug out, and I'm not giving you the POKE to disable that one!

Dear Tommy, **The VERIFY command when used in the immediate mode shows the 'SEARCHING' and 'FOUND name' messages. When included in a program and RUN these messages do not appear. Try this simple program:**

```
10 VERIFY
```

But if you GOTO 10 instead of running the program, the messages appear again. Why does this happen, and can the messages be made to appear if you RUN a program?

When Basic carries out the VERIFY command, it checks to see if the statement is being used in direct or deferred mode. In deferred mode the messages are supressed to avoid messing up your screen displays. If you want to make the messages always appear, change your program to this:

```
10 POKE 157,128: VERIFY
```

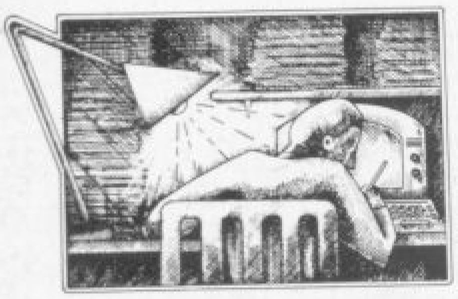
You can turn the messages off again by setting 157 to zero.

It does depend on the program concerned. If the program has been written in assembler, as most of the best games are, there is not much hope of converting it into Vic unless you have access to the source program.

Basic programs are much easier, in fact most will run without much modification at all, apart from the screen layouts. The problem here is those which use Basic *and* machine-code subroutines, or which have a lot of PEEKs and POKEs. Each of these tends to be a problem in itself, although **Vic Computing** did run an article on this in the very first issue.

If the program is well written and without too many PEEKs and POKEs then there should not be too much trouble, though.

Tommy's Tips



Dear Tommy, I have recently purchased a Vic-20 and C2N cassette unit. Would you please tell me how I can save a program but prevent it from being LISTed by an unauthorised person? I have searched through a great amount of literature for the answer to this problem and asked many people to no avail. Please can you help?

This is the 20th Century's equivalent of the alchemists' search for the elixir of life, the quest for the Holy Grail or the secret of what the War of Austrian Succession was really about. There is unfortunately no way of protecting software without going to a lot of trouble; and any system to do it *must* include some hardware as well as some pretty clever software. Odd little tricks appear in the magazines from time to time, but they can all be cracked in a few minutes. And once they have been printed everybody knows the way round them anyway!

Dear Tommy, Can you please tell me how to connect my Vic to a colour monitor. I know that the five-pin DIN socket on the back is a video output, but I don't know how to connect this to the BNC connector that a monitor requires.

Without knowing the details of your monitor it is difficult to say whether it will be possible to connect it to a Vic; but here goes. There are two video outputs on the video/audio port. Pin 5 is a high-level signal, pin 4 a low-level one; and pin 2 is ground.

The way to wire up the cable is to connect pin 2 on the Vic to the ground on the BNC plug and the signal on the BNC to either pin 4 or 5 on the Vic (whichever gives the better picture).

I must however say what I always do when people ask me about connecting things to their Vic: *do be careful!* The Vic itself is fairly safe, but your monitor is an unknown quantity and could be lethal if connected incorrectly or if it is faulty.

If you are in any doubt you should consult your Commodore dealer. he has the tremendous advantage of being able to look at the monitor and check it over – he should even be able to make you up a lead. I have to give advice without seeing the units, which is quite difficult.

Dear Tommy, I am experiencing problems in controlling commercial Vic-20 programs with the standard Commodore joystick. Certain programs *(Star Battle, Gorf, Alien Blitz)* respond perfectly. But with others, such as *Ratrace* and *Traxx*, I am unable to direct left. A friend has tested the joystick on his machine in conjunction with the problem programs and no fault has occurred.

I keyed in the joystick demo program given in *Mastering the Vic-20*, and it has worked perfectly – indicating that the games port switching is IK; this has increased my confusion. I would be grateful for advice.

An interesting one, this! If the programs work with *your* joystick on another Vic, then the program and your joystick are probably all right.

The reason I say 'probably' is this. The most likely cause of the problem is that a chip in your Vic is borderline – it is faulty, but not completely. Different programs use the chip in different ways; and some, but not others, cause the fault to occur. You will have to take the Vic together with one of the problem programs to a dealer for repair, but it could be expensive – intermittent faults are an absolute pain to find!



Dear Tommy, **When you answered a previous query of mine you said that my problem was possibly due to a filled-up stack. I waited until the fault reappeared and then PEEked from memory locations 511 to 370. I did this in direct mode so as not to alter any variable with a new FOR loop in a new program. *All* were "full" (contained a value) and probably each one down to 256 was too. Consequently, I assumed you were correct, and that my program was filling up the stack. But (and here comes the crunch) neither CLR, NEW, STOP-RESTORE *or* switching off would clear the stack of these values. I tried a new five-line program and found that this altered locations 511 and 510, but the others remained unaltered!**

Surely the stack should be *all* zeros whennot inuse? Or is this a fault in my Vic?

I am afraid that maybe I did not explain myself properly. *Every* - location in memory has to contain a value. When we talk of a location as being 'empty' we mean that we have not acutally set the value: in fact, every location contains a fairly random value when the Vic is turned on. All that happens when the processor wants to use some more stack space is that it just puts values into the 'new' locations; and when it has finished with them it just ignores them – but the values stay there. The processor keeps track of which locations it has used by means of one of its internal registers called the *Stack Pointer*, which points to the next location to be used in the stack. Unfortunately you cannot test this register from Basic, so it is very difficult without special software to tell whether the stack is full up.

By the way, even in direct mode you will still be using the stack. It is in constant use all the time Basic is running, not only when you use FOR loops or subroutines. So you have to be very careful how you interpret the results you get from looking at the stack from Basic.

Dear Tommy, **I have discovered a way to create an undeletable line on my Vic (not unlistable, *undeletable*). Try this little program:**

```
0 REM COPYRIGHT (C) 1983
D.R. WHAYMAN, BELEPER
```

Now type:

```
POKE 4099,255: POKE
  4100,255
```

Continue typing in the program:

```
10 POKE 36878,15
20 POKE 36876,225
30 FOR I=1 TO 100: NEXT
40 POKE 36876,0
50 FOR I=1 TO 100: NEXT
60 GOTO 20
```

. . . and RUN it. Here comes the exciting bit! Stop theprogram and type LIST.

Instead of a line 0 at the start of the program, there is a line 65535 at the end. Because the highest line number you can directly enter is 63999 this line is undeletable. But can you tell me if these POKEs will do anything to ruin long programs?

Well done! It is fun messing around with computers, and that is also one of the best ways to learn about the insides of the Vic. Doing these POKEs cannot actually harm the program; all you are doing is to change the line number, and when the program is running that is only really used to find line references in a GOTO or GOSUB. If a line has an 'impossible' line number, all it means is that you cannot jump to it.

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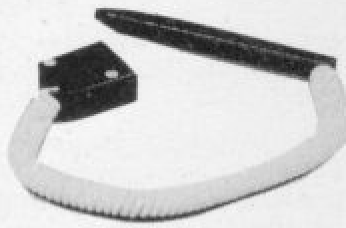
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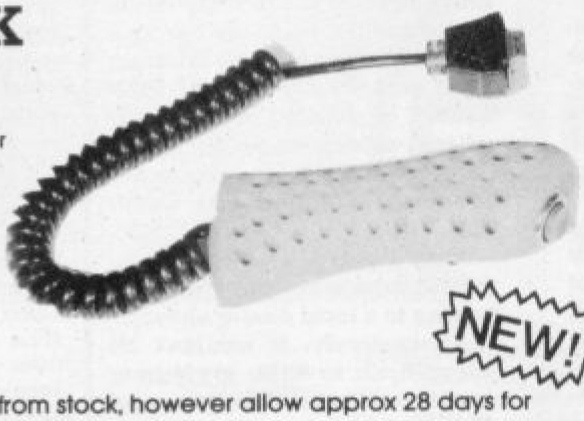
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Letters

Hit ban

I wonder if we will ever manage to banish the expression "HIT ANY KEY" from programs, especially games? In your October issue on page 44 we even had "hit the space bar" in the description column for a game.

Keys should not be *hit*: they should be *pressed*. "Hit" is inappropriate, and is being used as American slang, e.g. "hit the road" or "hit the town".

"Any key" is misleading and can also cause the user to dither, wondering which key to press. I kid you not, for I have seen it happen – often. Anyway, try pressing the shift key or the Commodore logo key and see if anything happens.

Why not use "SPACE TO CONTINUE"? The space bar is the nearest and largest key, and is therefore the obvious one to use for this kind of thing. Also I suggest clearing the keyboard buffer before using GET in this context, so as to avoid unintentional input caused by dropped knitting, gold bangles, sneeze-induced twitches etc. On the Vic this would be done by POKE 198,0. e.g:

```
900 PRINT" [rev]SPACE TO
    CONTINUE": POKE198,0:
    REM CLEAR KBD
902 GET A$:IF A$<>""THEN
    902: REM SPACE
904 PRINT"[cud][cud][cud][cud]
    [cur]":REM 4 × cud
```

Graphics are still a pain to decipher in listings. Could authors please give us more explanation, rather than merely saying "take care with the graphics", which doesn't help?

Have a good 1984 and don't hit the bottle too much!

John P. Marchant, 43 Bowhill, Putnoe, Bedford MK41 8EQ.

Modern Times

I am now 64 years of age and have had to retire from active business and professional life due to severe back trouble from an old fractured pelvis of 1939; and sitting at an ordinary typewriter is absolutely deadly for me.

So I have bought a Vic 20 and Seikosha GP-100VC Printer plus tape recorder, and this works out great – I can sit back on my tilting chair with my feet up and compose my letters with the Vic on my knee. No rubbing out or carbons – it takes about three times as long as ordinary typing, but no back-ache.

My views on computers are that they are the thing for the future. But I am appalled at the amount of effort that is being wasted in producing stupid games like shooting down spacecraft; we are learning to be Philistines, a world of sadists. Your magazine is a worthwhile venture, but there is far too much emphasis on these games. I am wondering if a computer can really do something useful, and if so what?

I can approve of such things as chess, where at least one can use one's brain as distinct from the animal reflexes to press a button to shoot down a space craft! Still, I suppose it is like pop music (which I detest) – at least the money involved brought great improvements in recording systems and playback. The same will apply to computers; Star Wars games promote cash flow for better research to improve computers.

I took half a course with the OU on computers – which was diabolical; they have no idea of how to put the subject over by this in effect correspondence course, and my tutor was of no use to me.

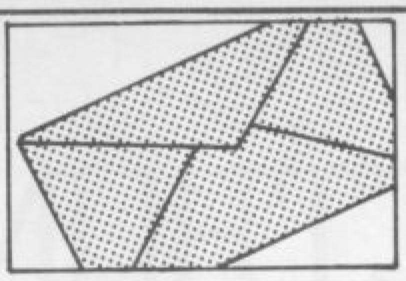
I learnt very little, but would like to know more. Do you know of any simple book that can tell me what happens to the current that passes and how a transistor works? The best I have seen was on TV with an electronic microscope blow-up showing the current flowing slowly along the circuit wire, but the programme stopped so I have no idea what happened to the current at the end. I understand binary: but this does not tell me what the current does. If I knew this then I may perhaps start to play around with some program that may make my life easier – but certainly no mazes or Star Wars!

James Dixon FCA, Riverside Cottages, Acomb, Hexham, Northumberland NE46 4QJ.

More Lore

Just a quick note, firstly to congratulate you and the rest of the gang for the first edition of **Commodore User**. My feeling is that it will become the only magazine worth reading for the small Commodore machine user.

There were, I'm afraid, a couple of typos which crept into the last **Todd's Lore**. Just in case you get any queries, on page 28, column 4, line 17 "bit six" should read "bit five" (that may have been my mistake!"). The others are on page 29 – the bottom of column 2 should be "PRINT 5=6"; and in column 4, the binary value of −1 should be all ones, and not all zeroes.



Incidentally, the letter on page 61 (from Ian Creasey, who seems a little bitter about something!) mentions that the reviews of Programmers' Aids has a CLEAR command in the command list. It does; but it shouldn't! In fact, it refers to "clear to end of line, screen etc." which were in the original table but got missed out.

Once again, best wishes with the new mag!

Mike Todd 27 Nursery Gardens, Lodgefield, Welwyn Garden City, Hertfordshire AL7 1SF.

Costing query

I am in need of a costing program for my recently aquired Vic-20, one which will allow me to input cost of ingredients, labour, overheads on the one side and on the other put recipes with production time, yield and a profit margin. The result should give me a retail price for each product; and, by altering any price changes as they occur, let me obtain a new price across the board.

A software package seems the obvious answer, but I cannot find one whose advertising seems appropriate. I would therefore be most grateful if you could recommend something suitable. Any other comment your greater experience suggests would also be welcome.

D Dawson, 318 Wilmslow Road, Fallowfield, Manchester M14 6XQ

Two immediate thoughts: we know of a print production department that does a similar-sounding costing exercise for analysing print and typesetting quotes by using a spreadsheet calculator package on the 64 (Kobra's CalcResult, as it happens). With that you can get all kinds of 'what if' costings, and in particular the user can set up a calculation to compare different input quotes for different combinations of printing requirement; when a new quote comes in this firm just enters the new figures to see how the bottom line works out.

That doesn't seem too far removed from what you want. Try talking to a local dealer about it.

Alternatively, it wouldn't be too difficult to write a program for yourself to handle all the possible combinations of different costs for different products and add the other variables you need. Why not try it?

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